HMK-40

UK Model

STEREO MUSIC SYSTEM

SPECIFICATIONS

FM TUNER SECTION

Frequency range:	87.5 to 108 MHz
Usable sensitivity:	7 dB (2.2 μV), S/N = 30 dB
Signal-to-noise ratio:	65 dB
Fm stereo separation:	Better than 35 dB

A-M TUNER SECTION

Frequency range:	MW 530 to 1,605 kHz LW 150 to 350 kHz
Sensitivity:	MW 48 dB/m (250 μV/m), built-in antenna 26 dB (20 μV), external antenna LW 52 dB/m (400 μV/m), built-in antenna 45 dB (180 μV), external antenna
Signal-to-noise ratio:	MW/LW 50 dB

AUDIO AMPLIFIER SECTION

Continuous RMS power output (IHF):	20 watts total (THD 1 %, 1 kHz)
Harmonic distortion:	Less than 1 % at 1 kHz at 20 watt output
Frequency response:	TAPE: 70 Hz to 40 kHz at 1 watt output PHONO: RIAA equalization curve ±2 dB

GENERAL

Power requirements:	240 V ac, 50/60 Hz
Power consumption:	120 watts
Dimensions:	632 (w) x 195 (h) x 446 (d) mm $24\frac{7}{8}$ (w) x $7\frac{5}{8}$ (h) x $17\frac{1}{2}$ (d) inches
Net weight:	15.5 kg (34 lb 3 oz)
Shipping weight:	20 kg (44 lb 1 oz) without speakers

STEREO CASSETTE DECK SECTION

Track:	4 track, 2 channel
Tape speed:	4.8 cm/sec ($1\frac{7}{8}$ ips)
Wow and flutter:	Less than 0.22 % wrms

RECORD PLAYER SECTION (GARRARD SP-25MKIV)

(Automatic Return, Automatic Shut-off Mechanism)

Speeds:	$33\frac{1}{3}$, 45 and 78 rpm
Drive system:	Idler-drive

SPEAKER SECTION

System:	2-way
Impedance:	8 ohms

SONY®

SERVICE MANUAL

SECTION 1
TECHNICAL DESCRIPTION

1-1. SPECIFICATIONS

Fm Tuner Section

Frequency range:	87.5 to 108 MHz
Antenna terminals:	75 ohms unbalanced 300 ohms balanced
Intermediate frequency:	10.7 MHz
Usable sensitivity:	7 dB (2.2 μV), S/N = 30 dB
Signal-to-noise ratio:	65 dB
Harmonic distortion:	Mono: 0.5 % at 400 Hz Stereo: 1.0 % at 400 Hz
Fm stereo separation:	Better than 35 dB,

A-m Tuner Section

Frequency range:	MW 530 to 1,605 kHz LW 150 to 350kHz
Antenna:	MW/LW built-in ferrite-bar antenna and external antenna terminal
Intermediate frequency:	MW/LW 468kHz
Sensitivity:	MW 48 dB/m (250μV/m), built-in antenna 26 dB (20μV), external antenna LW 52 dB/m (400μV/m), built-in antenna 45 dB (180μV), external antenna
Signal-to-noise ratio:	MW/LW 50dB
Harmonic distortion:	MW/LW 0.8% at 400Hz

Audio Amplifier Section

Continuous RMS power output: (IHF)	20 watts total (THD 1%, 1 kHz)
Harmonic distortion:	Less than 1 % at 1 kHz at 20 watt output
Frequency response:	PHONO: RIAA equalization curve ± 2 dB TAPE: 70 Hz to 40 kHz at 1 watt output
Input sensitivity and impedance:	MIC: 0.775 mV, 49 k ohms TAPE: 440 mV, 50 k ohms REC/PB: (input) 440 mV, 50 k ohms
Signal output and impedance:	REC OUT: 250 mV, 10 k ohms REC/PB: (output) 30 mV, 80 k ohms
Signal-to-noise ratio:	TAPE: REC/PB: (input) Better than 75 dB with 440 mV input PHONO: (MAGNETIC) Better than 50 dB with 2 mV input
Tone controls:	BASS: ± 10 dB at 100 Hz TREBLE: ± 10 dB at 10 kHz
Loudness control:	+ 6 dB at 100 Hz + 3 dB at 10 kHz (volume control attenuation: 30 dB)

General:

Circuit system:	FM stereo, FM/MW/LW superheterodyne tuner, SEPP OTL power amplifier
Power requirements:	240 V ac, 50/60 Hz
Power consumption:	120 watts
Dimensions:	632 (w) x 195 (h) x 446 (d) mm 24⅞ (w) x 7⅝ (h) x 17½ (d) inches
Net weight:	15.5 kg (34 lb 3 oz)
Shipping weight:	20 kg (44 lb 1 oz), in shipping carton without speakers

Stereo Cassette Deck Section

See page 41.

Record Player Section

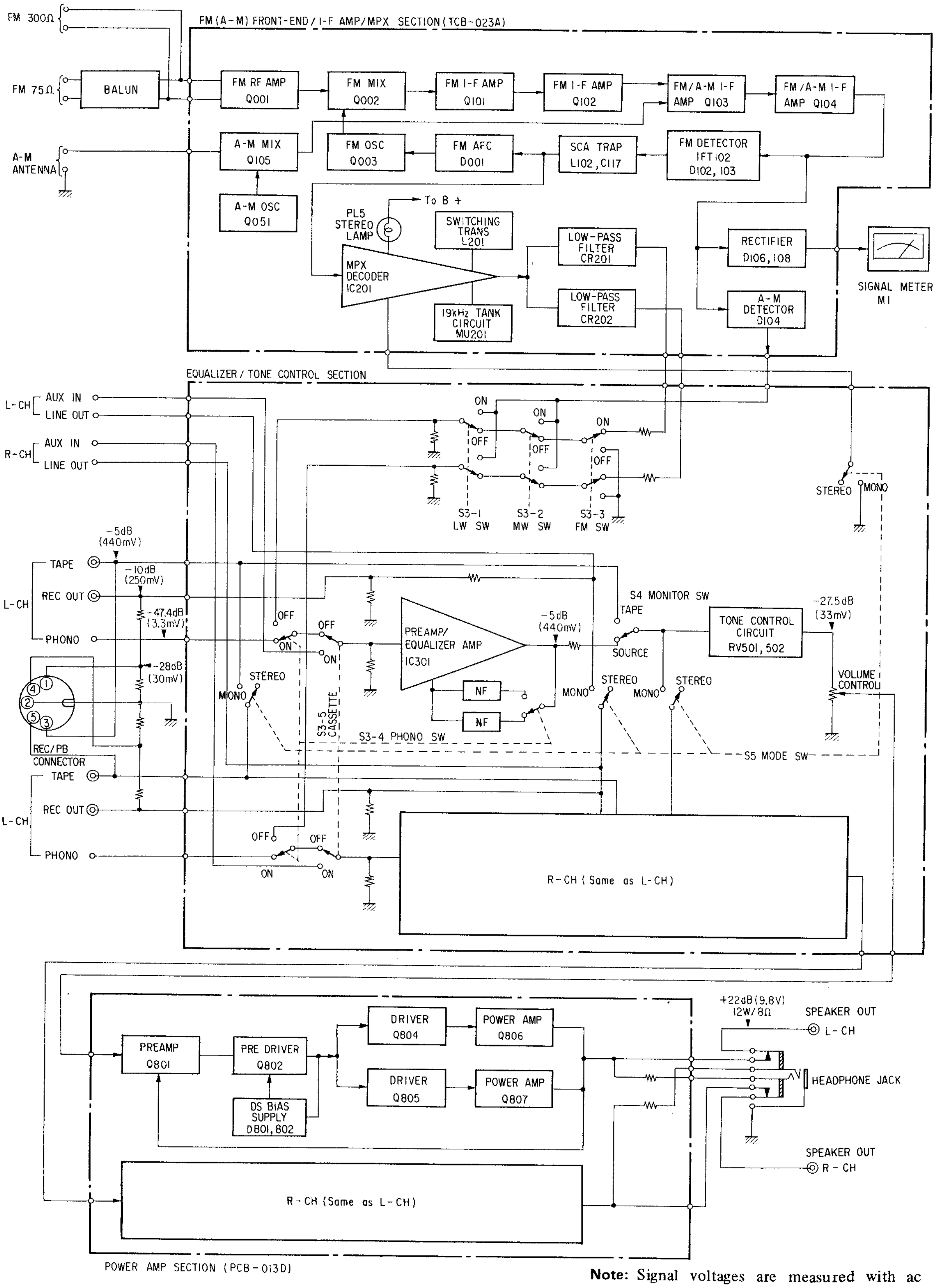
GARRARD SP-25MKIV
(Automatic Return, Automatic Shut-off Mechanism)

Platter:	26.7 cm (10½") dia
Speeds:	33⅓, 45 and 78 rpm
Drive system:	Idler-drive
Motor:	4-pole shading synchronous
Optimum stylus force:	3 g
Cartridge:	Magnetic type VL-30G
Stylus:	ND-133G (Conical 0.5 mil diamond)

Speaker Section

System:	2-way Woofer: 16 cm (6⁵⁄₁₆") cone type Tweeter: 5 cm (2") cone type
Impedance:	8 ohms
Dimensions:	255 (w) x 405 (h) x 185 (d) mm 10 (w) x 16 (h) x 7¼ (d) inches
Net weight:	4 kg (8 lb 13 oz)
Shipping weight:	10 kg (22 lb 7 oz), pair in shipping carton

1-3. BLOCK/LEVEL


FM 300Ω
FM 75Ω
BALUN
A-M ANTENNA
FM (A-M) FRONT-END / I-F AMP/MPX SECTION (TCB-023A)
FM RF AMP Q001
FM MIX Q002
FM I-F AMP Q101
FM I-F AMP Q102
FM/A-M I-F AMP Q103
FM/A-M I-F AMP Q104
A-M MIX Q105
FM OSC Q003
FM AFC D001
SCA TRAP L102, C117
FM DETECTOR IFT102 D102, 103
A-M OSC Q051
PL5 STEREO LAMP
To B +
SWITCHING TRANS L201
MPX DECODER IC201
19kHz TANK CIRCUIT MU201
LOW-PASS FILTER CR201
LOW-PASS FILTER CR202
RECTIFIER D106, 108
A-M DETECTOR D104
SIGNAL METER M1
EQUALIZER / TONE CONTROL SECTION
L-CH AUX IN
LINE OUT
R-CH AUX IN
LINE OUT
ON
OFF
S3-1 LW SW
S3-2 MW SW
S3-3 FM SW
STEREO
MONO
-5dB (440mV)
TAPE
-10dB (250mV)
L-CH
REC OUT
-47.4dB (3.3mV)
PHONO
-28dB (30mV)
REC/PB CONNECTOR
S3-5 CASSETTE
S3-4 PHONO SW
PREAMP/ EQUALIZER AMP IC301
NF
NF
-5dB (440mV)
S4 MONITOR SW
SOURCE
TONE CONTROL CIRCUIT RV501, 502
-27.5dB (33mV)
VOLUME CONTROL
S5 MODE SW
R-CH (Same as L-CH)
PREAMP Q801
PRE DRIVER Q802
DS BIAS SUPPLY D801, 802
DRIVER Q804
DRIVER Q805
POWER AMP Q806
POWER AMP Q807
+22dB (9.8V) 12W/8Ω
SPEAKER OUT L-CH
HEADPHONE JACK
SPEAKER OUT R-CH
R-CH (Same as L-CH)
POWER AMP SECTION (PCB-013D)

Note: Signal voltages are measured with ac VTVM and expressed in dB referred to 0.775 V, 1 kHz.

SECTION 2
DISASSEMBLY AND REPLACEMENT

Note: All screws are Phillips type (cross recess type), unless otherwise indicated.
(–): slotted head

2-1. RECORD PLAYER REMOVAL

See Fig. 2-1.

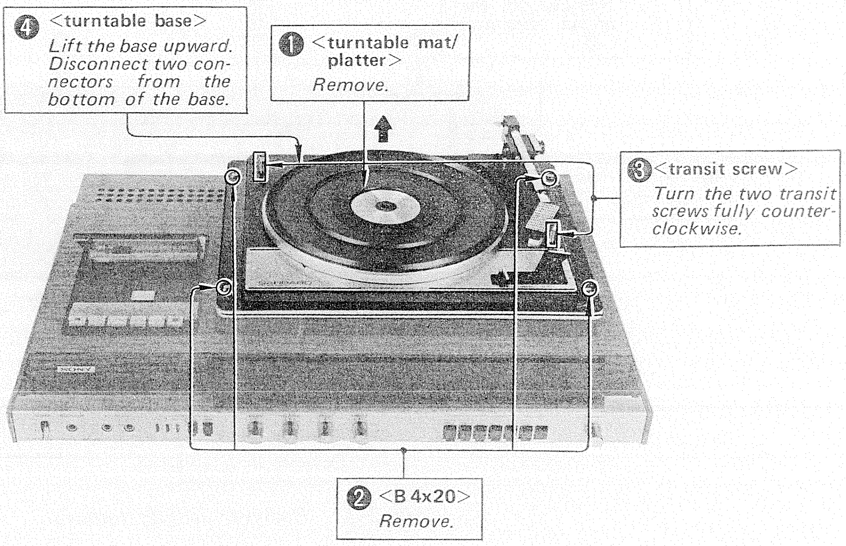

④ <turntable base>
Lift the base upward. Disconnect two connectors from the bottom of the base.
① <turntable mat/ platter>
Remove.
③ <transit screw>
Turn the two transit screws fully counterclockwise.
② <B 4x20>
Remove.

Fig. 2-1. Record player removal

2-2. RECORD PLAYER CABINET REMOVAL

See Fig. 2-2.

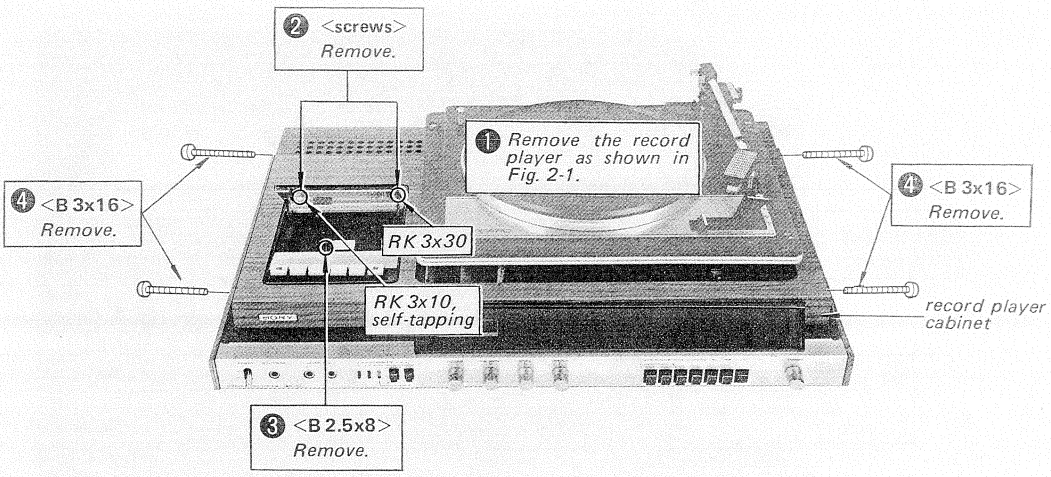
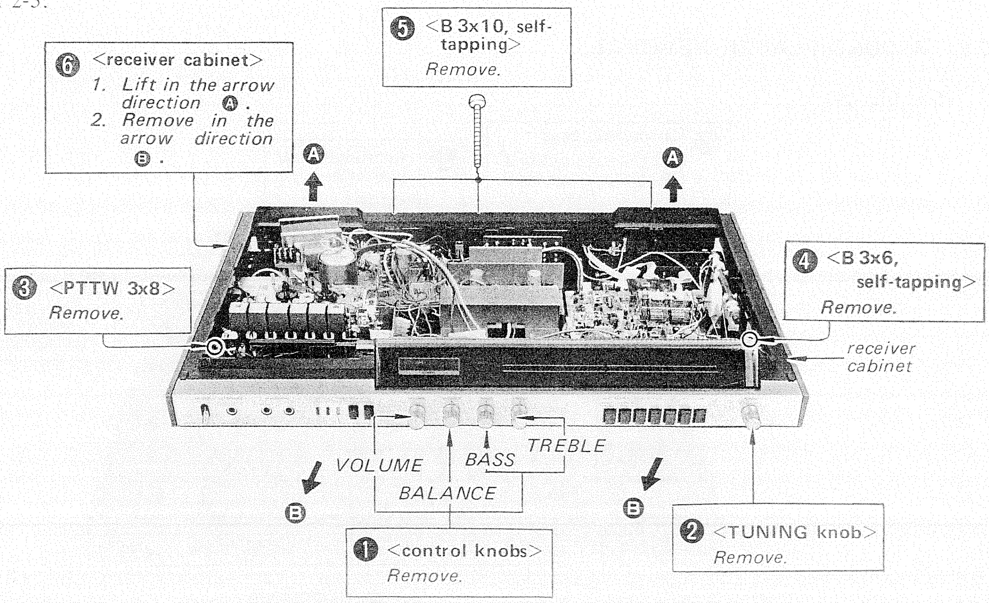

② <screws>
Remove.
① Remove the record player as shown in Fig. 2-1.
④ <B 3x16>
Remove.
RK 3x30
RK 3x10, self-tapping
④ <B 3x16>
Remove.
record player cabinet
③ <B 2.5x8>
Remove.

Fig. 2-2. Record player cabinet removal

2-3. RECEIVER CABINET REMOVAL

1. Remove the record player cabinet as shown in Fig. 2-2.
2. See Fig. 2-3.



❶ <control knobs> *Remove.*

❷ <TUNING knob> *Remove.*

❸ <PTTW 3x8> *Remove.*

❹ <B 3x6, self-tapping> *Remove.*

❺ <B 3x10, self-tapping> *Remove.*

❻ <receiver cabinet>
1. Lift in the arrow direction Ⓐ.
2. Remove in the arrow direction Ⓑ.

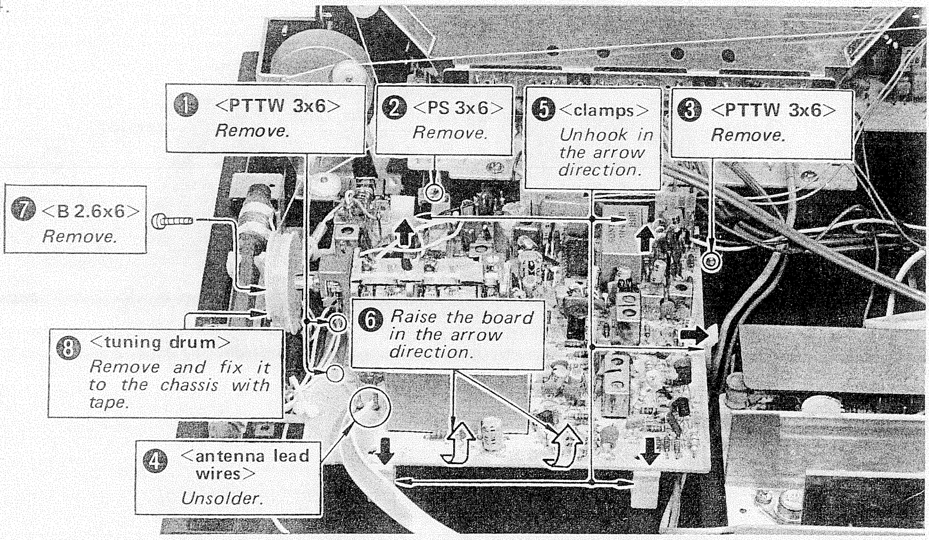
Fig. 2-3. Receiver cabinet removal

2-4. COMPLETE CIRCUIT BOARD REMOVAL

Remove the receiver cabinet as shown in Fig. 2-3 to remove the following circuit boards.

● Fm (A-m) Front-end/I-f Amp/MPX Board

See Fig. 2-4.



❶ <PTTW 3x6> *Remove.*

❷ <PS 3x6> *Remove.*

❸ <PTTW 3x6> *Remove.*

❹ <antenna lead wires> *Unsolder.*

❺ <clamps> *Unhook in the arrow direction.*

❻ *Raise the board in the arrow direction.*

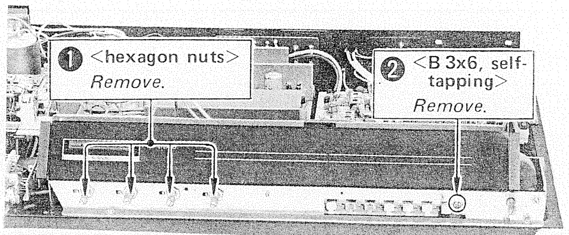
❼ <B 2.6x6> *Remove.*

❽ <tuning drum> *Remove and fix it to the chassis with tape.*

Fig. 2-4. Fm (a-m) front-end/i-f amp/mpx board removal

- **Equalizer/Tone Control Board**

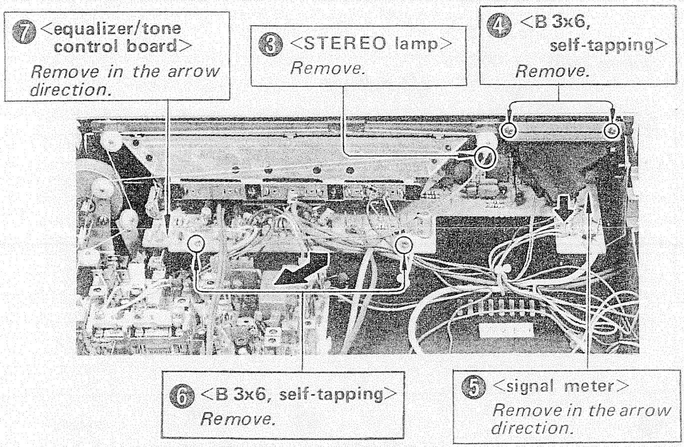
See Fig. 2-5 and Fig. 2-6.



① <hexagon nuts> *Remove.*

② <B 3x6, self-tapping> *Remove.*

Fig. 2-5. Equalizer/tone control board removal (1)



⑦ <equalizer/tone control board> *Remove in the arrow direction.*

③ <STEREO lamp> *Remove.*

④ <B 3x6, self-tapping> *Remove.*

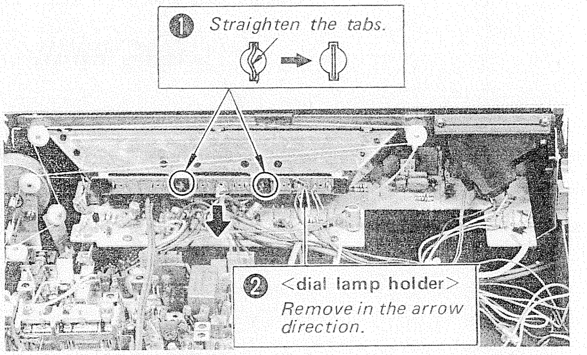
⑥ <B 3x6, self-tapping> *Remove.*

⑤ <signal meter> *Remove in the arrow direction.*

Fig. 2-6. Equalizer/tone control board removal (2)

2-5. DIAL LAMP REPLACEMENT

1. Remove the record player cabinet as shown in Fig. 2-2.
2. See Fig. 2-7.

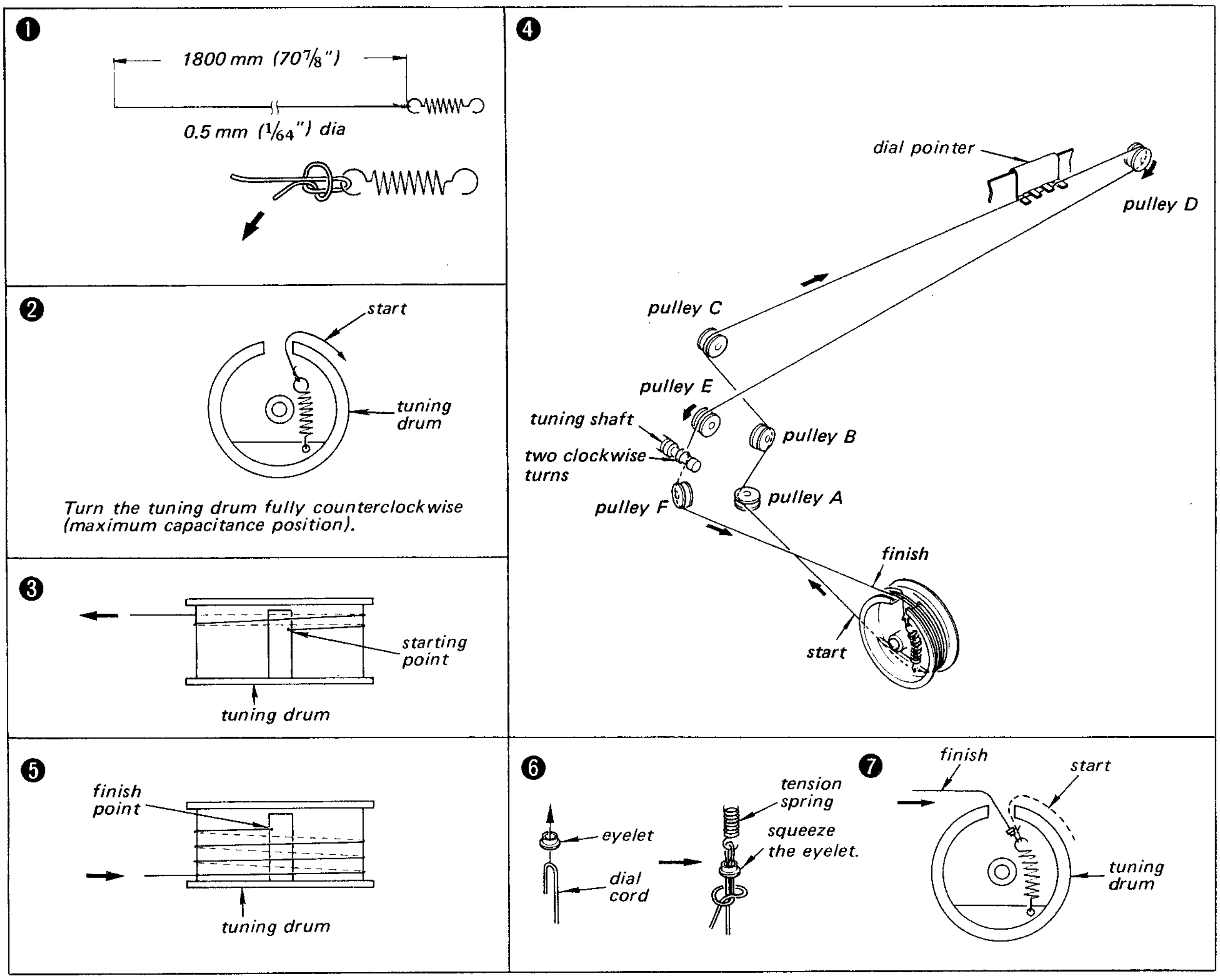


① *Straighten the tabs.*

② <dial lamp holder> *Remove in the arrow direction.*

Fig. 2-7. Dial lamp replacement

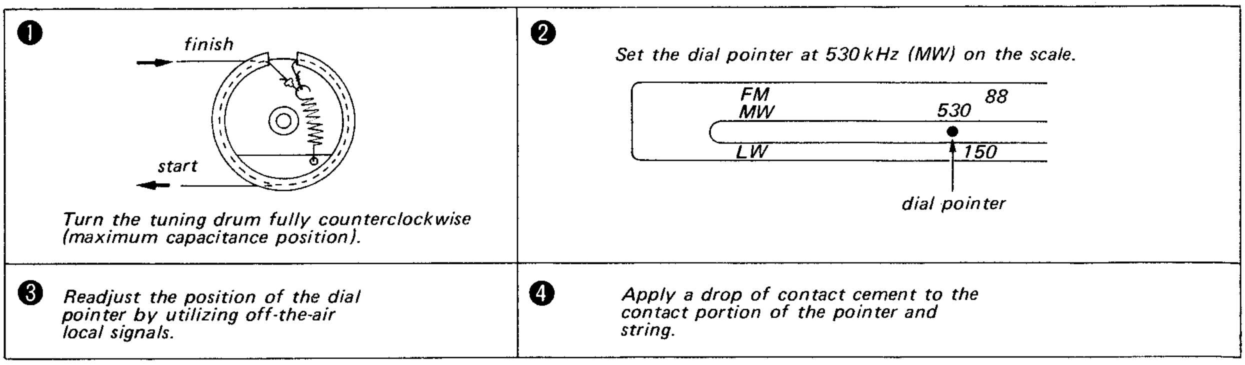
2-6. DIAL CORD STRINGING


❶
1800 mm (70⅞")
0.5 mm (1/64") dia
❷
start
tuning drum
❸
starting point
tuning drum
❹
dial pointer
pulley D
pulley C
pulley E
tuning shaft
two clockwise turns
pulley B
pulley A
pulley F
finish
start
❺
finish point
tuning drum
❻
eyelet
dial cord
tension spring
squeeze the eyelet.
❼
finish
start
tuning drum

Turn the tuning drum fully counterclockwise (maximum capacitance position).

Fig. 2-6. Dial cord stringing

2-7. MECHANICAL DIAL CALIBRATION


❶
finish
start
❷
FM
MW
LW
88
530
150
dial pointer
❸
❹

❶ Turn the tuning drum fully counterclockwise (maximum capacitance position).

❷ Set the dial pointer at 530 kHz (MW) on the scale.

❸ Readjust the position of the dial pointer by utilizing off-the-air local signals.

❹ Apply a drop of contact cement to the contact portion of the pointer and string.

Fig. 2-7. Mechanical dial calibration

2-8. CHASSIS LAYOUT

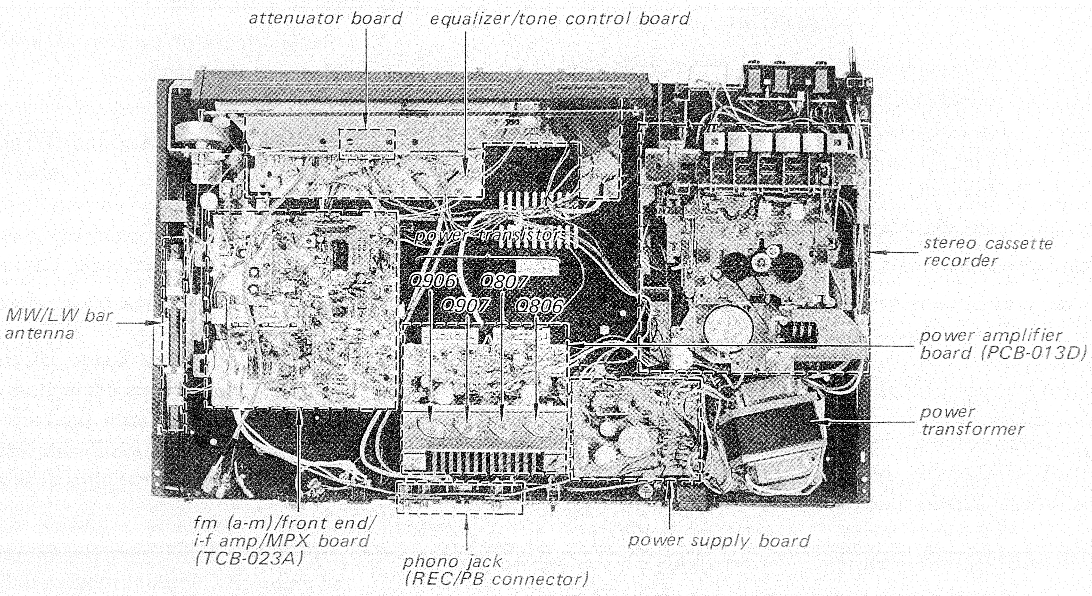
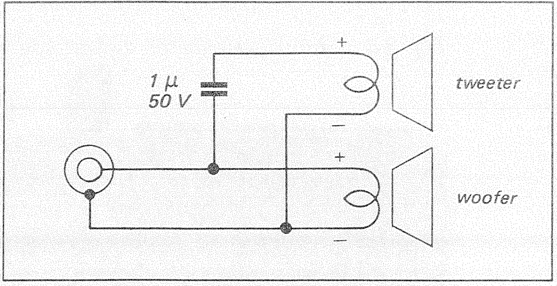

attenuator board
equalizer/tone control board
power transistor
Q906
Q807
Q907
Q806
MW/LW bar antenna
stereo cassette recorder
power amplifier board (PCB-013D)
power transformer
fm (a-m)/front end/ i-f amp/MPX board (TCB-023A)
phono jack (REC/PB connector)
power supply board

Fig. 2-10. Chassis layout

2-9. SPEAKER REMOVAL

1. Pry out the front panel from the wooden cabinet with a screwdriver.
2. Remove the speaker by taking out the screws shown in Fig. 2-11.

Note: When replacing the speaker cord, remove the woofer first.


1 µ
50 V
+
−
tweeter
+
−
woofer

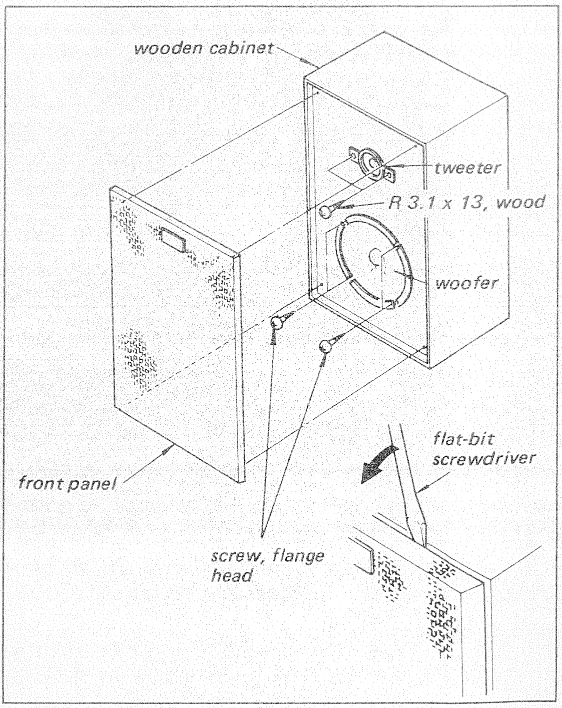

wooden cabinet
tweeter
R 3.1 x 13, wood
woofer
flat-bit screwdriver
front panel
screw, flange head

Fig. 2-11. Speaker removal

SECTION 3
ALIGNMENT AND ADJUSTMENT

3-1. FM I-F AND DISCRIMINATOR ALIGNMENT

CAUTION

The ceramic filters in the fm i-f circuit are selected according to their specified center frequencies and color coded as shown in Fig. 3-1 and listed in Table 3-1. Check the color code of the filters to identify the same center frequency when replacing any of these filters.

TABLE 3-1.
FM I-F CERAMIC FILTERS

Part No.	*Color*	*Specified Center Freq.*
1-527-220-11	red	10.70 MHz
1-527-220-21	blue	10.67 MHz
1-527-220-31	orange	10.73 MHz
1-527-220-41	black	10.64 MHz
1-527-220-51	white	10.76 MHz

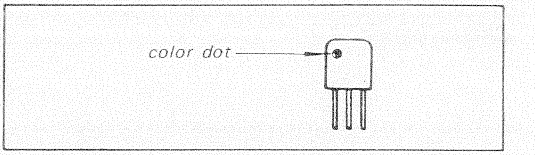


Fig. 3-1. Color dot on ceramic filters

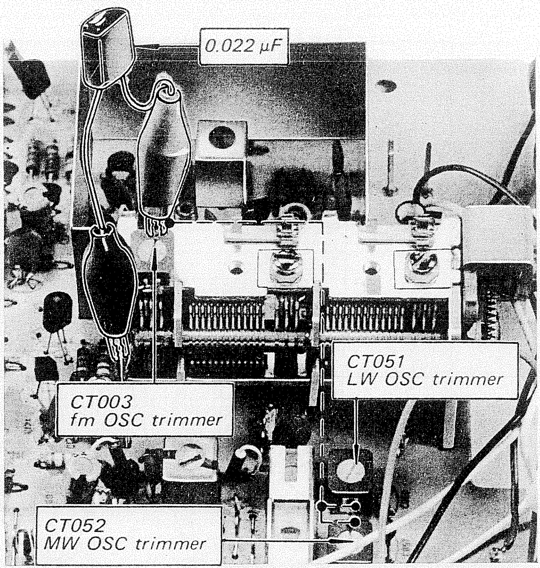

0.022 μF
CT003
fm OSC trimmer
CT051
LW OSC trimmer
CT052
MW OSC trimmer

Fig. 3-2. Interruption of fm or a-m local oscillator operation

Note: Local oscillator should be killed when performing this alignment. To stop the local oscillator's operation, shunt the oscillator capacitor with a 0.022 μF capacitor as shown in Fig. 3-2.

Signal Generator Method

Test Equipment Required

1. Signal generator capable of generating a 10.7-MHz a-m/fm signal.
2. Oscilloscope
   Vertical sensitivity . . . 100 mV/cm minimum
3. Alignment tools
4. Ac VTVM

Preparation

1. Connect the input cable of the oscilloscope with alligator clips to connection point of R154 and C111, and ground on the fm (a-m) front-end/i-f amp/MPX board and solder a 0.022 μF capacitor across these clips as shown in Fig. 3-3.
2. Connect the output cable of the signal generator across CT002 on the fm (a-m) front-end/i-f amp/MPX board through a 0.022 μF coupling capacitor as shown in Fig. 3-4.

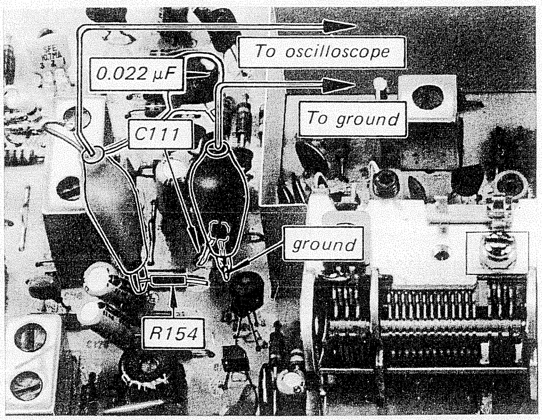

0.022 μF
To oscilloscope
To ground
C111
ground
R154

Fig. 3-3. Fm discriminator output connection

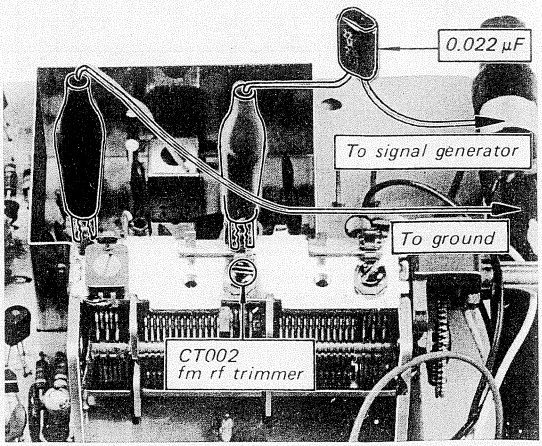

0.022 μF
To signal generator
To ground
CT002
fm rf trimmer

Fig. 3-4. 10.7 MHz signal injection

Procedure

1. With the equipment connected as shown in Fig. 3-5, set the signal-generator controls as follows:
   Frequency .... Specified center frequency of ceramic filter. See Table 3-1.
   Modulation .... Fm, 400 Hz, 100% (75 kHz deviation)
   Output level .... 1,000 µV (60 dB)
2. Set the receiver controls as follows:
   FUNCTION switch..... FM
   VOLUME control....... Minimum
3. Adjust the signal generator frequency slightly to obtain a maximum output, and then change the signal generator's modulation to a-m, 400-Hz 30%.
4. If the discriminator transformer IFT102 (See Fig. 3-13) is not aligned correctly, 400 Hz ripple will be observed as shown in Fig. 3-6.
5. Turn the secondary side core (green) of discriminator transformer IFT102 (See Fig. 3-13) with an alignment tool to obtain a minimum indication on the oscilloscope as shown in Fig. 3-6.

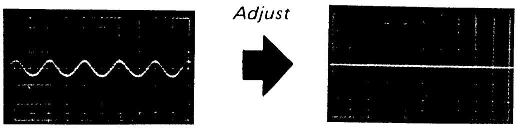


Fig. 3-6. Fm discriminator alignment output response

Note: Turn the core carefully and slowly because the output appearing on the oscilloscope jumps up and down when turning the core. This might cause difficulty in determining the point of minimum output.
Also, at both extreme positions of the secondary core, decreased output will be observed. The real null point should be obtained in the middle of the core thread length, and maximum output appears at each side of the true null point.

6. Change the signal generator modulation to fm, 400 Hz 100% (75 kHz deviation).
7. Turn the core of fm i-f transformer IFT001 (See Fig. 3-13) and the primary side core (brown) of discriminator transformer IFT102 (See Fig. 3-13), to obtain the maximum output.

3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Note: Before starting this alignment, be sure that the fm i-f and discriminator alignment has been performed, and that the dial is mechanically calibrated as described in Procedure 2-7 on page 8.

Signal Generator Method

Test Equipment Required

1. Fm signal generator
2. Ac VTVM
3. Alignment tools
4. Oscilloscope

Preparation

1. Connect the equipment as shown in Fig. 3-7.
2. Set the receiver controls as follows:
   FUNCTION switch..... FM
   VOLUME control....... Minimum
3. Short the connection point of R154 and C111 (AFC circuit) to ground as shown in Fig. 3-8.

Procedure

Follow the procedures given in Table 3-2 when performing this alignment with an fm signal generator.

Off-the-Air Signal Method

The frequency-coverage alignment can also be performed by utilizing off-the-air local fm signals.

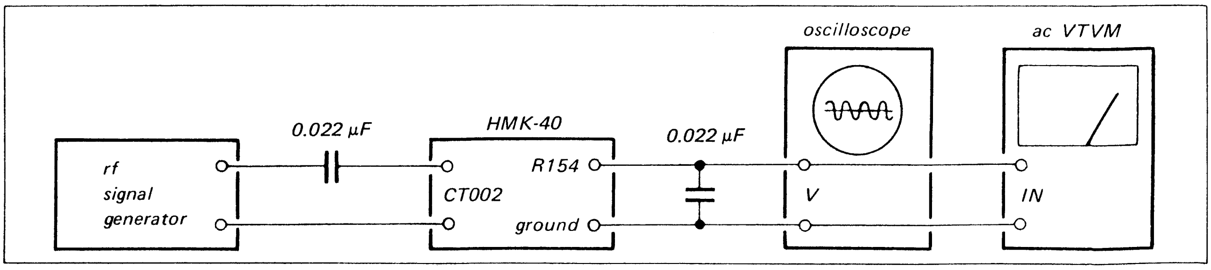


Fig. 3-5. Fm i-f and discriminator alignment setup by rf signal generator

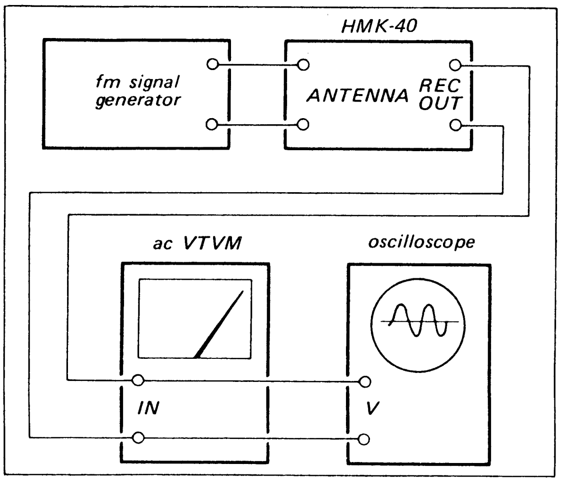


Fig. 3-7. *Fm frequency coverage and tracking alignment setup*

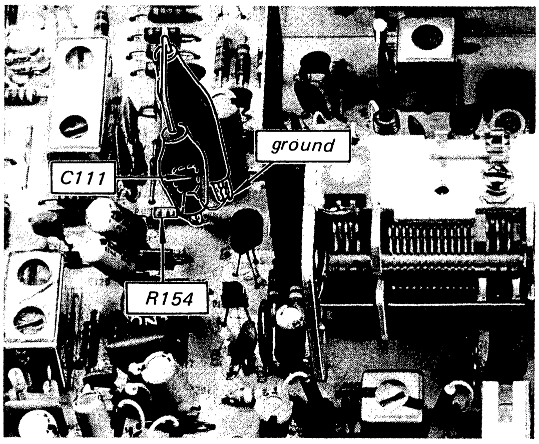


Fig. 3-8. *Interruption of AFC circuit*

TABLE 3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Step	SG Coupling	SG Frequency and Output Level	Dial Indication	Ac VTVM Connection	Adjust	Indication
	FM FREQUENCY COVERAGE ALIGNMENT					
1.	Direct coupling	87.2 MHz 400 Hz 75 kHz deviation (100%) mod. Output level; as low as possible	lowest position	REC OUT	OSC coil L002 See Fig. 3-13.	Maximum VTVM reading
2.	Same as above	108.4 MHz 400 Hz 75 kHz deviation (100%) mod. Output level; as low as possible	highest position	Same as above	OSC trimmer CT003 See Fig. 3-13.	Same as above
	FM TRACKING ALIGNMENT					
1.	Direct coupling	87.2 MHz 400 Hz 75 kHz deviation (100%) mod. Output level; as low as possible	lowest position	REC OUT	Antenna coil L001 RF coil L003 See Fig. 3-13.	Maximum VTVM reading
2.	Same as above	108.4 MHz 400 Hz 75 kHz deviation (100%) mod. Output level; as low as possible	highest position	Same as above	Antenna trimmer CT001 RF trimmer CT002 See Fig. 3-13.	Same as above

3-3. FM STEREO SEPARATION ADJUSTMENT

Test Equipment Required

1. Fm stereo signal generator
2. Ac VTVM
3. Oscilloscope
4. Alignment tools

Preparation

1. Remove the record player cabinet as described in Procedure 2-2 on page 5.
2. Connect the equipment as shown in Fig. 3-9, then set the fm stereo signal generator controls as follows:

Carrier frequency	98 MHz
Output level	1,000 μV (60 dB)
Mode	Stereo
Audio (400 Hz) Mod	67.5 kHz (90 %)*
Pilot (19 kHz) Mod	7.5 kHz (10 %)

***Note:** 75 kHz (100 %) if the metering indicates total modulation (audio+pilot).

Procedure

1. Precisely tune the receiver to the carrier frequency of stereo signal generator, then turn the top core of switching transformer L201 (See Fig. 3-13) to obtain maximum output at the left channel. Note that this adjustment has a close relationship with stereo distortion.
2. Record the output level of the left channel when the stereo signal generator input selector is set to the left channel.
3. Switch the stereo signal generator input selector to the right channel and read the residual signal level of the left channel.
4. The output-level to residual-level ratio represents the separation. Turn the top core of switching transformer L201 (See Fig. 3-13) for minimum residual level. Check the right channel for separation. Readjust switching transformer for minimum difference between left and right-channel separation.

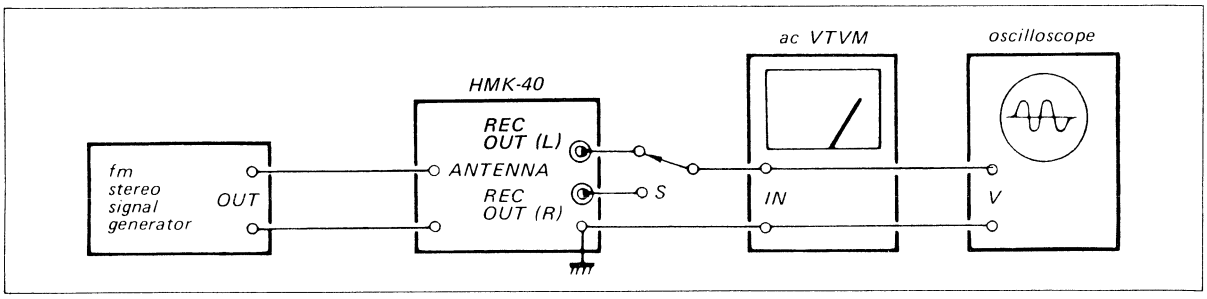


Fig. 3-9. Fm stereo separation adjustment setup

3-4. A-M I-F ALIGNMENT

Note: The a-m i-f transformers (CFU101 and IFT101) are shipped from the factory with all adjustments set for correct operation. Therefore no adjustment is required in the field service.

3-5. MW/LW FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Note: Before performing the following procedure, be sure that the dial is mechanically calibrated as described in Procedure 2-7 on page 8.

Preparation

1. Set the FUNCTION switch to MW or LW.
2. Set the A-M ANTENNA selector switch to BUILT-IN.

Signal Generator Method

Test Equipment Required

1. A-m signal generator
2. Loop antenna
3. Ac VTVM
4. Oscilloscope and alignment tools

Procedure

With the equipment connected as shown in Fig. 3-10, follow the procedures given in Table 3-3 and Table 3-4 when performing this alignment with an a-m signal generator.

Off-the-Air Signal Method

The frequency-coverage and tracking alignment can also be performed by utilizing off-the-air local a-m signals.

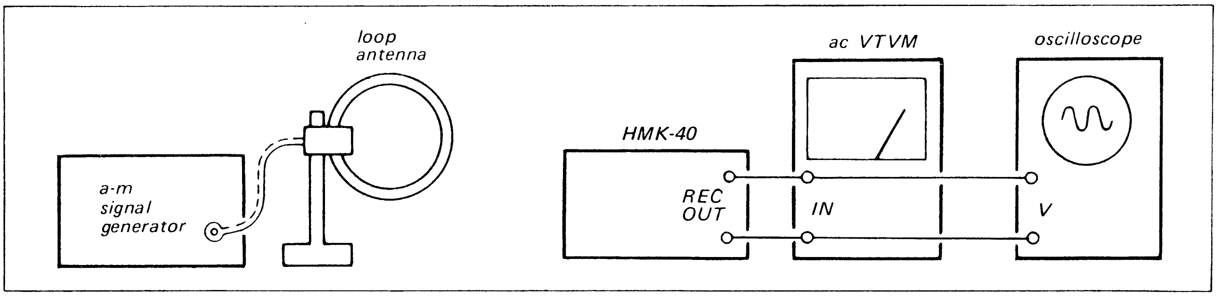


Fig. 3-10. MW/LW frequency coverage and tracking alignment setup

TABLE 3-3. MW FREQUENCY COVERAGE AND TRACKING ALIGNMENT

	FREQUENCY COVERAGE ALIGNMENT					
Step	**SG Coupling**	**SG Frequency and Output Level**	**Dial Indication**	**Ac VTVM Connection**	**Adjust**	**Indication**
1	Loop antenna	520 kHz 400 Hz 30 % mod. Output level: as low as possible	lowest position	REC OUT	OSC coil L052 See Fig. 3-13.	Maximum VTVM reading
2	Same as above	1,680 kHz Same as above	highest position	Same as above	OSC trimmer CT052 See Fig. 3-13.	Same as above
	TRACKING ALIGNMENT					
1	Loop antenna	600 kHz 400 Hz 30 % mod. Output level: as low as possible	Tune to the SG signal.	REC OUT	Position of antenna coil L055-M See Fig. 3-13.	Maximum VTVM reading
2	Same as above	1,400 kHz Same as above	Same as above	Same as above	Antenna trimmer CT053 See Fig. 3-13.	Same as above

TABLE 3-4. LW FREQUENCY COVERAGE AND TRACKING ALIGNMENT

	FREQUENCY COVERAGE ALIGNMENT					
Step	**SG Coupling**	**SG Frequency and Output Level**	**Dial Indication**	**Ac VTVM Connection**	**Adjust**	**Indication**
1	Loop antenna	145 kHz 400 Hz 30% mod. Output level: as low as possible	lowest position	REC OUT	OSC coil L051 See Fig. 3-13.	Maximum VTVM reading
2	Same as above	365 kHz Same as above	highest position	Same as above	OSC trimmer CT051 See Fig. 3-13.	Same as above
	TRACKING ALIGNMENT					
1	Loop antenna	145 kHz 400 Hz 30% mod. Output level: as low as possible	lowest position	REC OUT	Position of antenna coil L055-L See Fig. 3-13.	Maximum VTVM reading
2	Same as above	320 kHz Same as above	Tune to the SG signal.	Same as above	Antenna trimmer CT054 See Fig. 3-13.	Same as above

3-6. EXTERNAL ANTENNA COIL ALIGNMENT

Signal Generator Method

Test Equipment Required

1. A-m signal generator
2. LW dummy antenna (See Fig. 3-11.)
3. Ac VTVM or oscilloscope

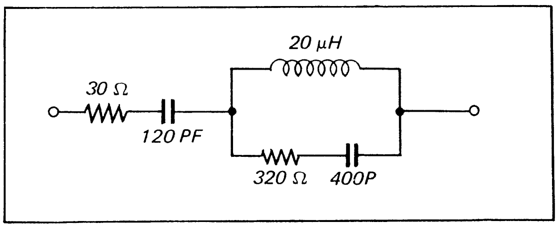


Fig. 3-11. LW dummy antenna

Preparation

1. Set the FUNCTION switch to LW.
2. Set the A-M ANTENNA selector switch to EXT.

Procedure

With the equipment connected as shown in Fig. 3-12, follow the procedure given in Table 3-5 when performing this alignment with an a-m signal generator.

Note: The off-the-air signal can be utilized instead of signal generator.

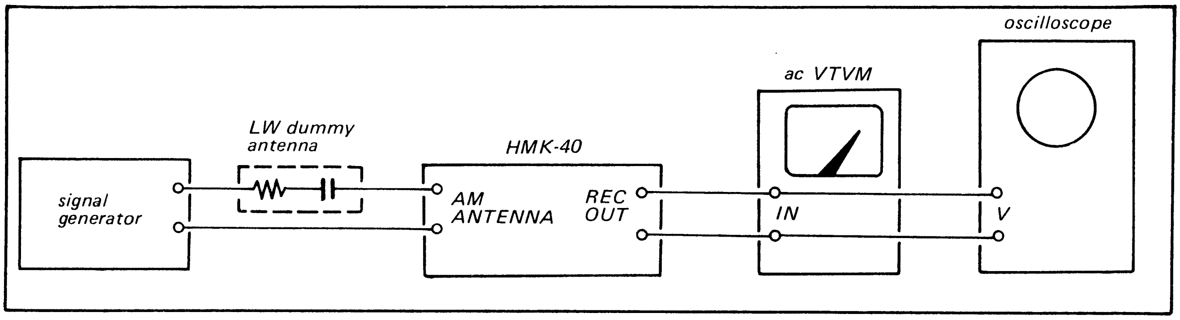

oscilloscope
ac VTVM
LW dummy antenna
HMK-40
signal generator
AM ANTENNA
REC OUT
IN
V

Fig. 3-12. External antenna coil alignment setup

TABLE 3-5. EXTERNAL ANTENNA COIL ALIGNMENT

SG Coupling	SG Frequency and Output Level	Dial Indication	Ac VTVM Connection	Adjust	Indication
Dummy antenna	250 kHz 400 Hz 30 % mod. Output level: as low as possible	Tune to the SG signal.	REC OUT	External antenna coil L053 See Fig. 3-13.	Maximum VTVM reading

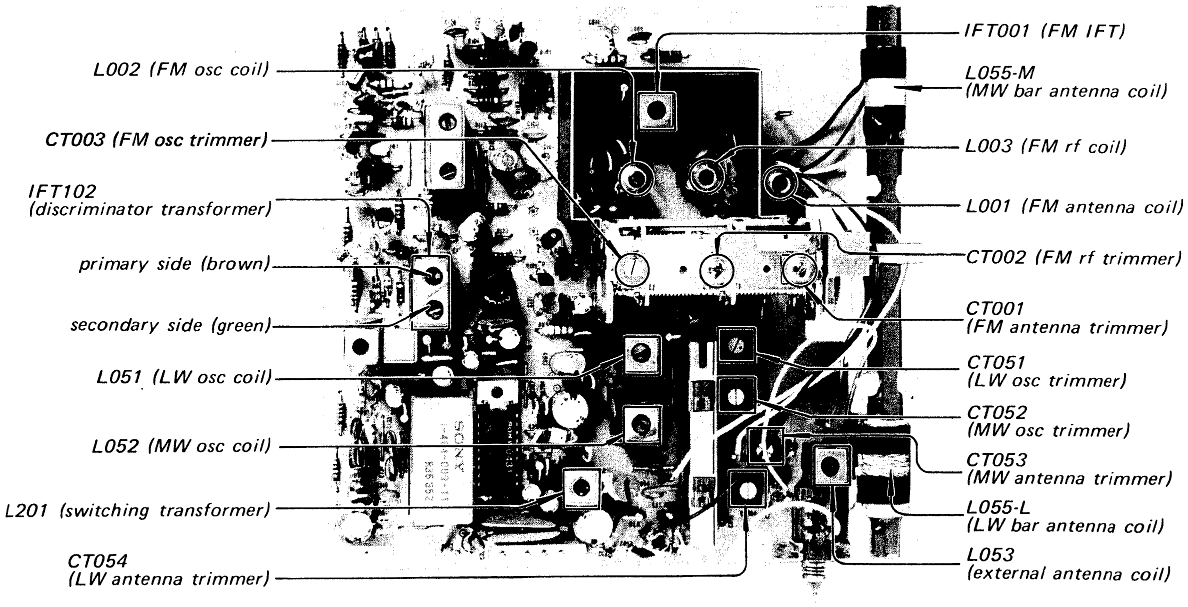

L002 (FM osc coil)
CT003 (FM osc trimmer)
IFT102 (discriminator transformer)
primary side (brown)
secondary side (green)
L051 (LW osc coil)
L052 (MW osc coil)
L201 (switching transformer)
CT054 (LW antenna trimmer)
IFT001 (FM IFT)
L055-M (MW bar antenna coil)
L003 (FM rf coil)
L001 (FM antenna coil)
CT002 (FM rf trimmer)
CT001 (FM antenna trimmer)
CT051 (LW osc trimmer)
CT052 (MW osc trimmer)
CT053 (MW antenna trimmer)
L055-L (LW bar antenna coil)
L053 (external antenna coil)

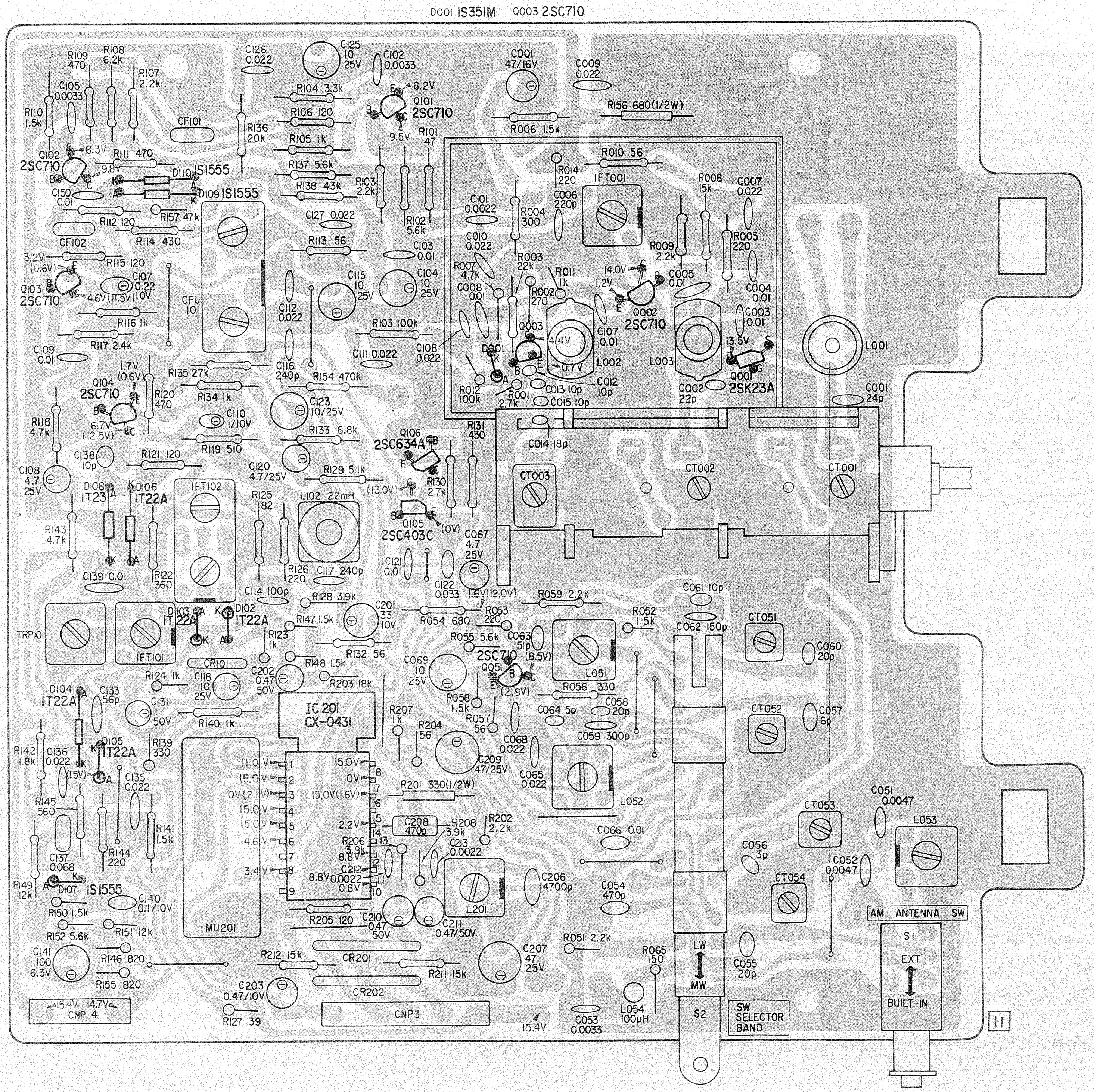
Fig. 3-13. Adjustment parts location

SECTION 4

DIAGRAMS

4-1. MOUNTING DIAGRAM – Fm (A-m) Front-End/I-f Amp/MPX Board –

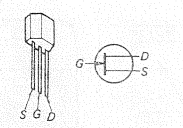
– Component Side –


D001 1S351M Q003 2SC710
Q101 2SC710
Q102 2SC710
Q103 2SC710
Q104 2SC710
Q106 2SC634A
Q105 2SC403C
Q002 2SC710
Q001 2SK23A
Q051 2SC710
IC201 CX-0431
MU201
IFT001
IFT101
IFT102
TRP101
CFU101
CF101
CF102
L001
L002
L003
L051
L052
L053
L102 22mH
L201
CT001
CT002
CT003
CT051
CT052
CT053
CT054
CR101
CR201
CR202
CNP 4
CNP3
AM ANTENNA SW
S1
EXT
BUILT-IN
LW
MW
S2
SW SELECTOR BAND
15.4V

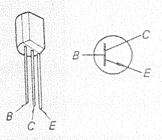
Semiconductor and Adjustment Parts Location

Q102 Q103 Q104 IC201 Q101 Q106 Q105 Q003 Q051 Q002 Q001	Q and IC
D104 D108 D106 D110 D107 D105 D109 D103 D102 D001	D
IFT102 CT003 L002 IFT001 L051 L052 L003 CT002 CT051 CT052 CT054 L001 CT053 CT001 L053	ADJ

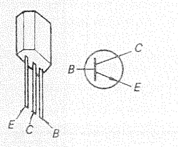
2SK23A



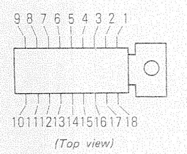
2SC710



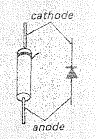
2SC403C
2SC634A



CX-0431


9 8 7 6 5 4 3 2 1
10 11 12 13 14 15 16 17 18
(Top view)

1S1555
1S351M
1T22A
1T23


cathode
anode

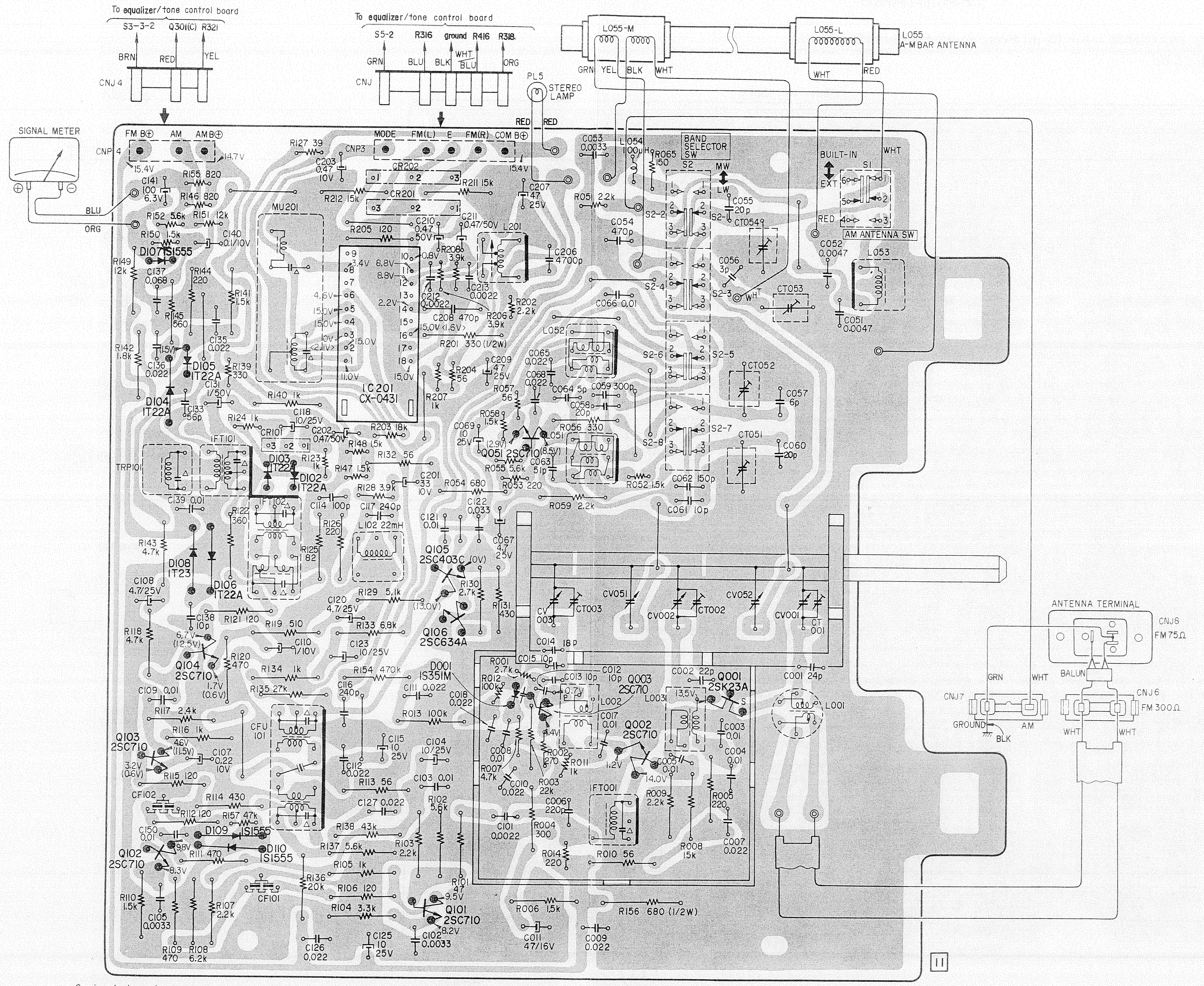
Note: ⌐⌐ shows the location of stencilled part number. Refer to this mark when replacing the part.

( ) : AM operation

< > : STEREO operation

4-2. MOUNTING DIAGRAM – Fm (A-m) Front-End/I-f Amp/MPX Board –

– Conductor Side –


To equalizer/tone control board
S3-3-2
Q301(C) R321
BRN
RED
YEL
CNJ4
To equalizer/tone control board
S5-2
R316
ground
R416
R318
GRN
BLU
BLK
WHT
BLU
ORG
CNJ
PL5
STEREO LAMP
L055-M
L055-L
L055 A-M BAR ANTENNA
GRN
YEL
BLK
WHT
WHT
RED
SIGNAL METER
CNP4
FM B⊕
AM
AM B⊕
14.7V
15.4V
BLU
ORG
MODE
FM(L)
E
FM(R)
COM B⊕
CNP3
MU201
IC201
CX-043I
BAND SELECTOR SW
S2
MW
LW
BUILT-IN
EXT
S1
AM ANTENNA SW
L052
L051
L053
L054
CT051
CT052
CT053
CT054
IFT101
IFT102
TRP101
CFU101
CF101
CF102
CR101
CR201
CR202
CV051
CV052
CV001
CV002
CV003
CT001
CT002
CT003
L001
L002
L003
L102 22mH
IFT001
Q001 2SK23A
Q002 2SC710
Q003 2SC710
Q051 2SC710
Q101 2SC710
Q102 2SC710
Q103 2SC710
Q104 2SC710
Q105 2SC403C
Q106 2SC634A
D001 IS35IM
D102 IT22A
D103 IT22A
D104 IT22A
D105 IT22A
D106 IT22A
D107 IS1555
D108 IT23
D109 IS1555
D110 IS1555
R156 680 (1/2W)
ANTENNA TERMINAL
CNJ6 FM 75Ω
CNJ6 FM 300Ω
CNJ7
BALUN
GRN
WHT
GROUND
AM
BLK
WHT
WHT
11

Semiconductor and Adjustment Parts Location

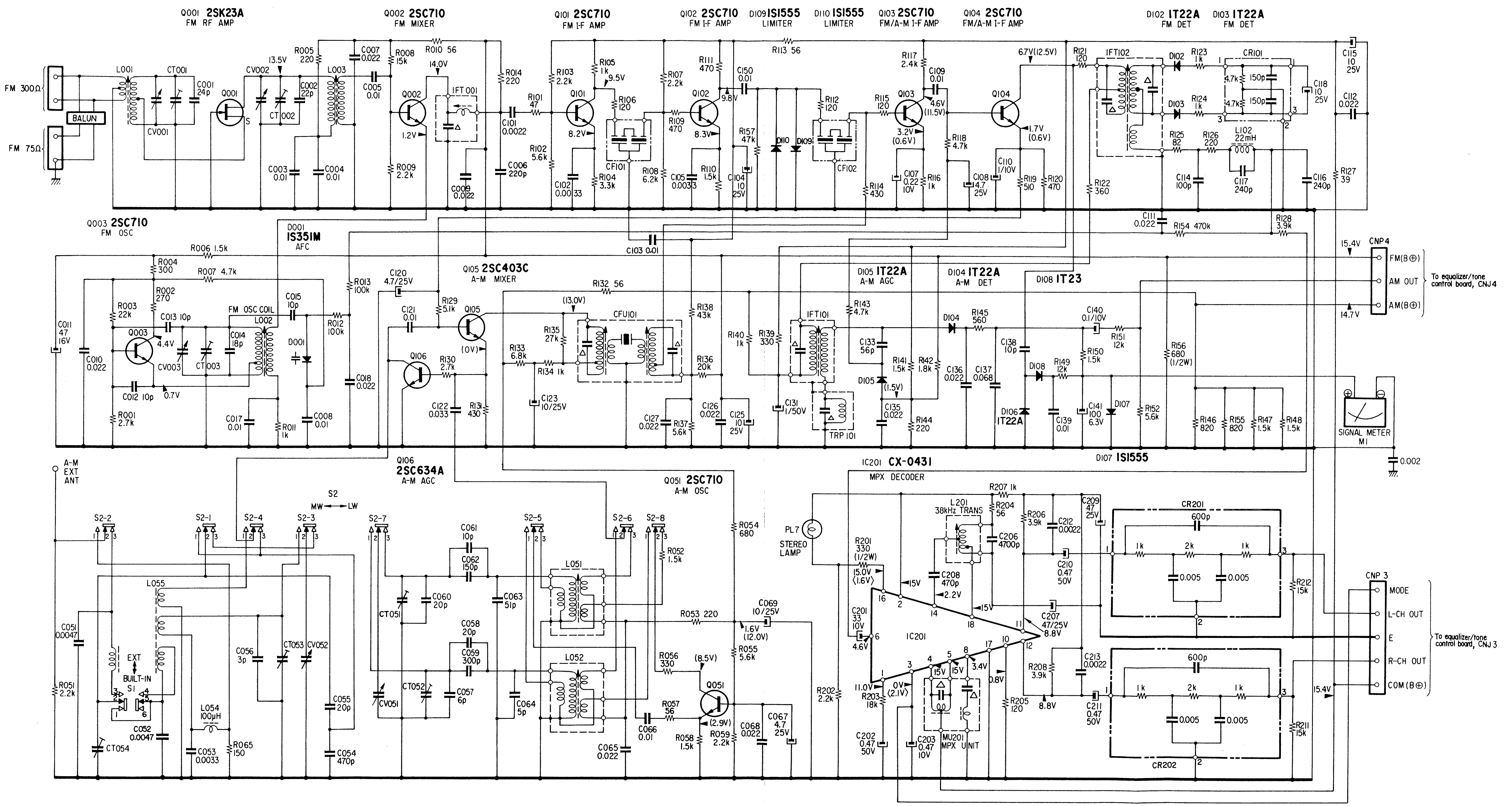
Q and IC	Q103 Q104 Q102 IC201 Q101 Q105 Q106 Q051 Q003 Q002 Q001
D	D107 D105 D109 D103 D102 D104 D108 D106 D110 D001
ADJ	IFT102 L052 L051 CT003 L002 IFT001 L003 CT054 L055 CT002 CT052 CT053 L053 CT051 L001 CT001

Note: ⌐ ¬← shows the location of stencilled part number. Refer to this mark when replacing the part.

( ) : AM operation

< > : STEREO operation

4-3. SCHEMATIC DIAGRAM – Fm (A-m) Front-End/I-f Amp/MPX Section –


Q001 2SK23A FM RF AMP
Q002 2SC710 FM MIXER
Q101 2SC710 FM I-F AMP
Q102 2SC710 FM I-F AMP
D109 1S1555 LIMITER
D110 1S1555 LIMITER
Q103 2SC710 FM/A-M I-F AMP
Q104 2SC710 FM/A-M I-F AMP
D102 1T22A FM DET
D103 1T22A FM DET
Q003 2SC710 FM OSC
D001 1S351M AFC
Q105 2SC403C A-M MIXER
D105 1T22A A-M AGC
D104 1T22A A-M DET
D108 1T23
D107 1S1555
Q106 2SC634A A-M AGC
Q051 2SC710 A-M OSC
IC201 CX-0431 MPX DECODER
FM 300Ω
FM 75Ω
BALUN
A-M EXT ANT
S2 MW LW
EXT BUILT-IN S1
L201 38kHz TRANS
PL7 STEREO LAMP
MU201 MPX UNIT
CR201
CR202
SIGNAL METER M1
CNP4
FM(B⊕)
AM OUT
AM(B⊕)
To equalizer/tone control board, CNJ4
CNP3
MODE
L-CH OUT
E
R-CH OUT
COM(B⊕)
To equalizer/tone control board, CNJ3
IFT001
IFT101
IFT102
CFU101
CF101
CF102
TRP101
L001
L002
L003
L051
L052
L054
L055
15.4V
14.7V

Note:

All resistance values are in ohms. k = 1,000 M = 1,000 k

All capacitance values are in μF except as indicated with p, which means $\mu\mu$F.

All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.

Voltage variations may be noted because of normal production tolerances.

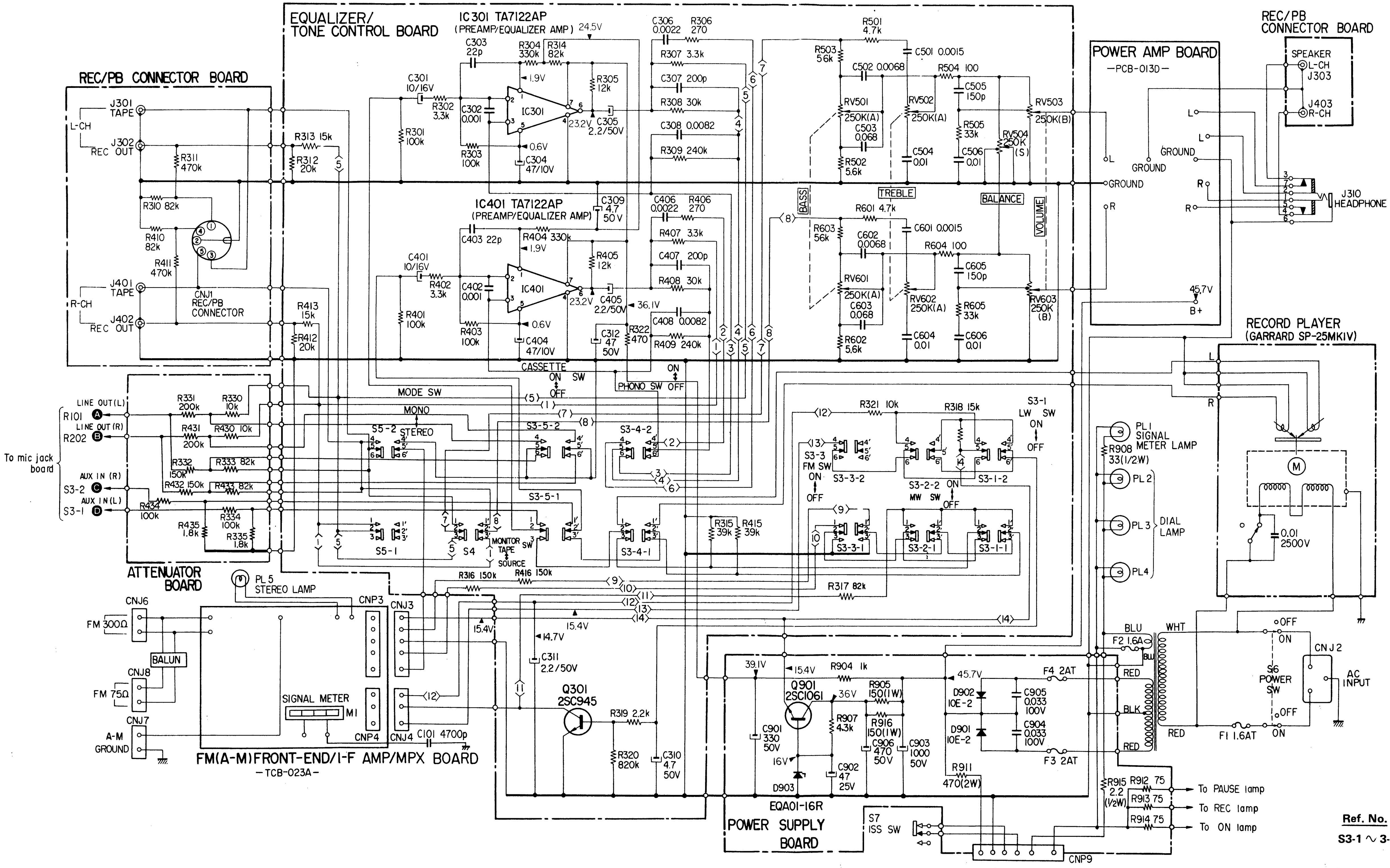
( ) : AM operation

< > : Stereo operation

Capacitors marked △ are built in transformers.

Ref. No.	Description	Position
S1	A-M ANTENNA (BUILT-IN – EXT)	BUILT-IN
S2	A-M BAND (LW – MW)	LW

4-4. SCHEMATIC DIAGRAM – Equalizer/Tone Control, REC/PB Connector, Attenuator and Power Supply Section –


EQUALIZER/ TONE CONTROL BOARD
IC301 TA7122AP (PREAMP/EQUALIZER AMP)
IC401 TA7122AP (PREAMP/EQUALIZER AMP)
REC/PB CONNECTOR BOARD
J301 TAPE
J302 REC OUT
J401 TAPE
J402 REC OUT
L-CH
R-CH
CNJ1 REC/PB CONNECTOR
BASS
TREBLE
BALANCE
VOLUME
RV501 250K(A)
RV502 250K(A)
RV503 250K(B)
RV504 250K (S)
RV601 250K(A)
RV602 250K(A)
RV603 250K (B)
POWER AMP BOARD
–PCB-0130–
REC/PB CONNECTOR BOARD
SPEAKER
L-CH J303
R-CH J403
J310 HEADPHONE
GROUND
B+
45.7V
RECORD PLAYER (GARRARD SP-25MKIV)
0.01 2500V
CASSETTE ON SW OFF
PHONO SW
MODE SW
MONO
STEREO
S5-2
S5-1
S3-5-2
S3-5-1
S3-4-2
S3-4-1
S3-3 FM SW ON OFF
S3-3-2
S3-3-1
S3-2-2 ON MW SW OFF
S3-2-1
S3-1 LW SW ON OFF
S3-1-2
S3-1-1
S4 MONITOR SW TAPE SOURCE
To mic jack board
LINE OUT(L) R101 Ⓐ
LINE OUT (R) R202 Ⓑ
AUX IN (R) S3-2 Ⓒ
AUX IN (L) S3-1 Ⓓ
ATTENUATOR BOARD
PL5 STEREO LAMP
PL1 SIGNAL METER LAMP
R908 33(1/2W)
PL2
PL3 DIAL LAMP
PL4
CNJ6 FM 300Ω
BALUN
CNJ8 FM 75Ω
CNJ7 A-M GROUND
SIGNAL METER M1
CNP3
CNJ3
CNP4
CNJ4 C101 4700p
FM(A-M)FRONT-END/I-F AMP/MPX BOARD
–TCB-023A–
Q301 2SC945
R319 2.2k
R320 820k
C310 4.7 50V
C311 2.2/50V
15.4V
14.7V
Q901 2SC1061
D902 10E-2
D901 10E-2
D903
EQA01-16R
POWER SUPPLY BOARD
S7 1SS SW
CNP9
F4 2AT
F3 2AT
F2 1.6A
F1 1.6AT
BLU
WHT
RED
BLK
S6 POWER SW ON OFF
CNJ2
AC INPUT
To PAUSE lamp
To REC lamp
To ON lamp

Note:

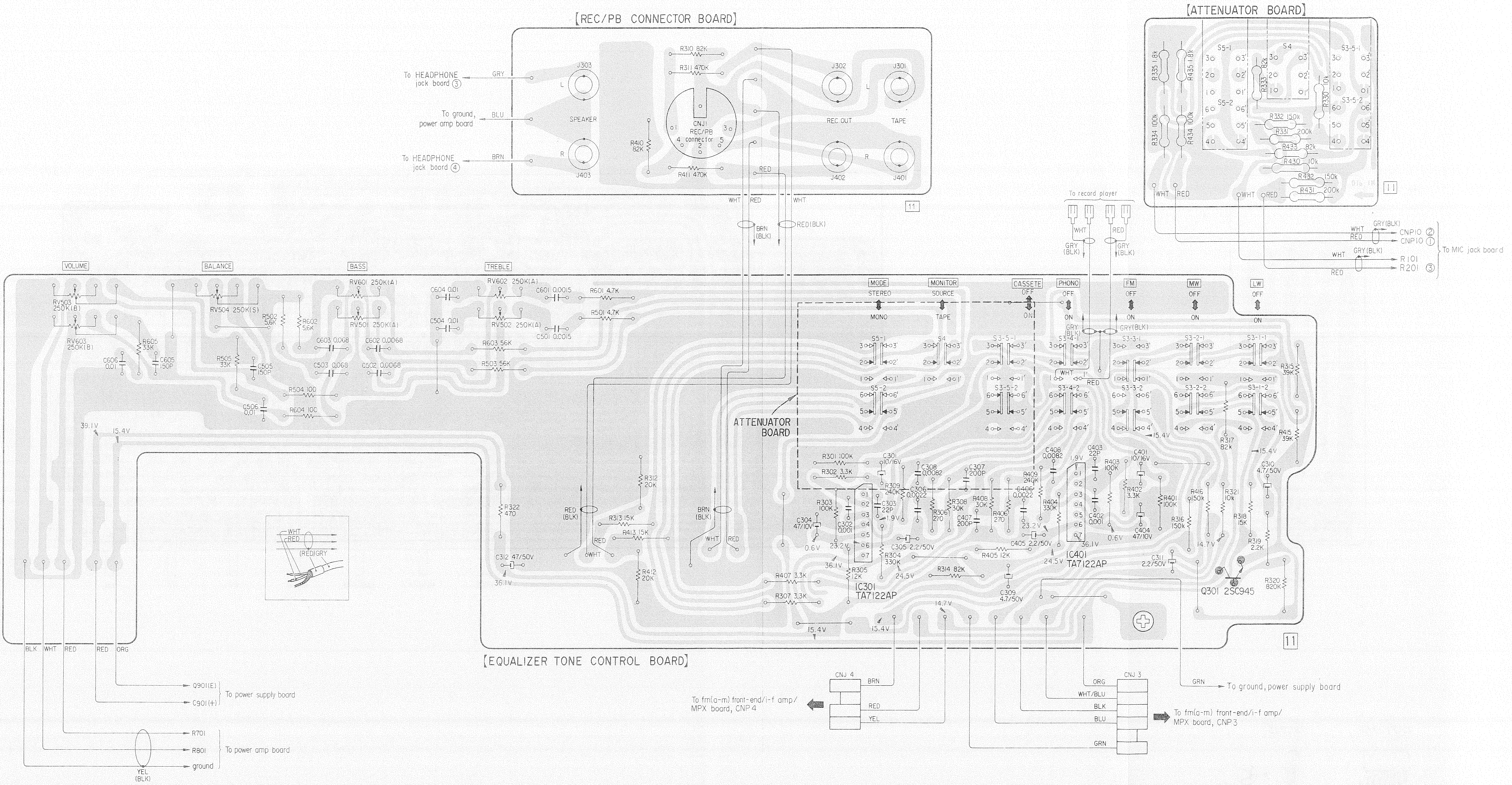
All resistance values are in ohms. k = 1,000, M = 1,000k
All capacitance values are in μF except as indicated with p, which means μμF.

All voltages are dc measured with a VOM which has an input impedance of 20k ohms/volt. No signal in. Voltage variations may be noted because of normal production tolerances.

Ref. No.	Description	Position
S3-1 ∿ 3-5	FUNCTION SW (LW – MW – FM – PHONO – CASSETTE)	FM
S4	MONITOR SW (TAPE – SOURCE)	SOURCE
S5	MODE SW (MONO – STEREO)	STEREO
S6	POWER SW	ON
S7	1SS SW (1 –2)	1

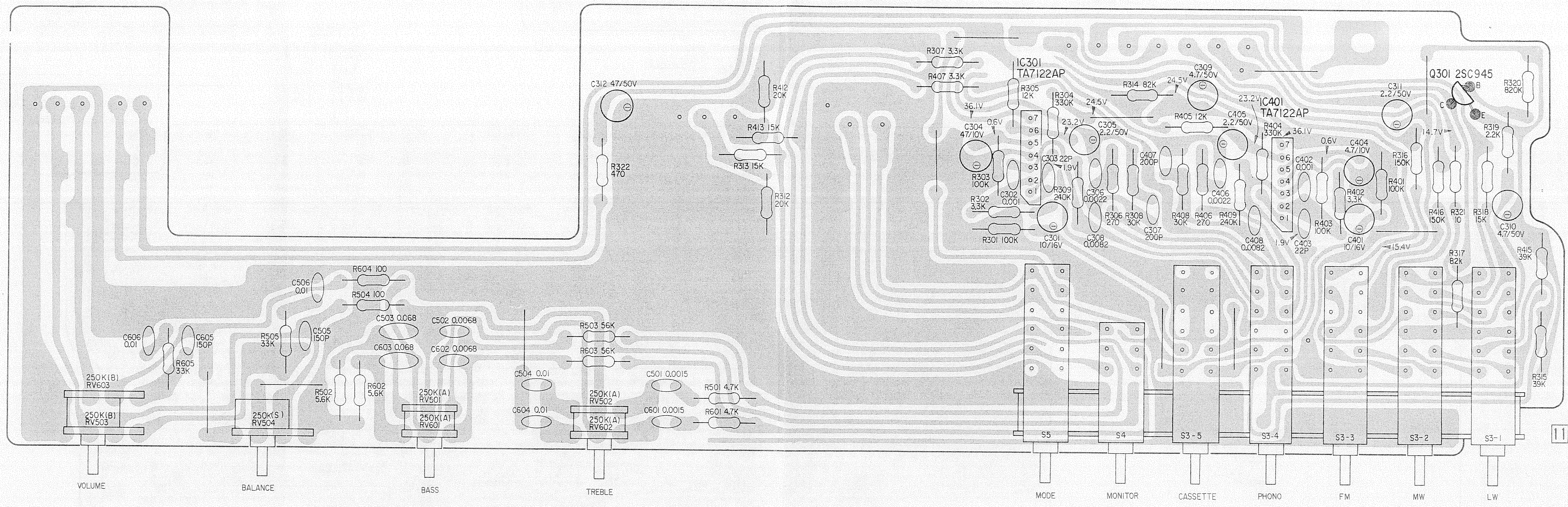
4-5. MOUNTING DIAGRAM – Equalizer/Tone Control, REC/PB Connector and Attenuator Board –

– Conductor Side –

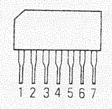

[REC/PB CONNECTOR BOARD]
To HEADPHONE jack board ③
GRY
To ground, power amp board
BLU
To HEADPHONE jack board ④
BRN
J303
L
SPEAKER
R
J403
R310 82K
R311 470K
CNJ1 REC/PB 4 connector 5
R410 82K
R411 470K
J302
J301
REC OUT
TAPE
J402
J401
RED
WHT
BRN (BLK)
RED(BLK)
11
[ATTENUATOR BOARD]
R335 1.8k
R435 1.8k
R334 100k
R434 100k
R333 82k
R330 10k
R332 150k
R331 200k
R433 82k
R430 10k
R432 150k
R431 200k
S5-1
S5-2
S4
S3-5-1
S3-5-2
WHT
RED
To record player
GRY (BLK)
GRY(BLK)
CNP10 ②
CNP10 ①
R101
R201 ③
To MIC jack board
VOLUME
BALANCE
BASS
TREBLE
RV503 250K(B)
RV603 250K(B)
RV504 250K(S)
RV601 250K(A)
RV501 250K(A)
RV602 250K(A)
RV502 250K(A)
R502 5.6K
R602 5.6K
R605 33K
C605 150P
C606 0.01
R505 33K
C505 150P
C603 0.068
C602 0.0068
C503 0.068
C502 0.0068
R504 100
R604 100
C506 0.01
C604 0.01
C504 0.01
C601 0.0015
C501 0.0015
R601 4.7K
R501 4.7K
R603 5.6K
R503 5.6K
39.1V
15.4V
MODE
STEREO
MONO
MONITOR
SOURCE
TAPE
CASSETE
OFF
ON
PHONO
FM
MW
LW
S5-1
S4
S3-5-1
S3-4-1
S3-3-1
S3-2-1
S3-1-1
S5-2
S3-5-2
S3-4-2
S3-3-2
S3-2-2
S3-1-2
ATTENUATOR BOARD
R312 20K
R322 470
C312 47/50V
36.1V
R313 15K
R413 15K
R412 20K
R301 100K
R302 3.3K
C301 10/16V
C308 0.0082
C307 200P
R309 240K
C306 0.0022
R303 100K
C303 22P
C304 47/10V
C302 0.001
R306 270
R308 30K
R408 30K
R406 270
C407 200P
C406 0.0022
R409 240K
C408 0.0082
C403 22P
R403 100K
C401 10/16V
R404 330K
R402 3.3K
R401 100K
C402 0.001
C404 47/10V
C305 2.2/50V
C405 2.2/50V
R304 330K
R305 12K
R405 12K
R407 3.3K
R307 3.3K
R314 82K
C309 4.7/50V
IC301 TA7122AP
IC401 TA7122AP
C311 2.2/50V
R315 39K
R415 39K
R317 82K
R416 150k
R321 10k
R316 150k
R318 15K
R319 2.2K
C310 4.7/50V
R320 820K
Q301 2SC945
0.6V
23.2V
1.9V
36.1V
24.5V
14.7V
15.4V
WHT
RED
(RED)GRY
[EQUALIZER TONE CONTROL BOARD]
BLK
WHT
RED
ORG
Q901(E)
C901(+)
To power supply board
R701
R801
ground
To power amp board
YEL (BLK)
CNJ 4
BRN
RED
YEL
To fm(a-m) front-end/i-f amp/ MPX board, CNP4
CNJ 3
ORG
WHT/BLU
BLK
BLU
GRN
To fm(a-m) front-end/i-f amp/ MPX board, CNP3
GRN
To ground, power supply board

4-6. MOUNTING DIAGRAM – Equalizer/Tone Control Board –

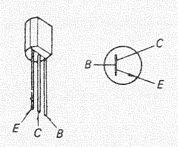
– Component Side –


C312 47/50V
R322
470
R412
20K
R413 15K
R313 15K
R312
20K
R307 3.3K
R407 3.3K
IC301
TA7122AP
R305
12K
R304
330K
R314 82K
24.5V
C309
4.7/50V
36.1V
C304
47/10V
0.6V
24.5V
23.2V
C305
2.2/50V
R405 12K
C405
2.2/50V
23.2V
IC401
TA7122AP
R404
330K
36.1V
C311
2.2/50V
Q301 2SC945
B
C
E
R320
820K
R319
2.2K
14.7V
R303
100K
C303 22P
1.9V
C302
0.001
R302
3.3K
R301 100K
C301
10/16V
R309
240K
C306
0.0022
C308
0.0082
R306
270
R308
30K
C407
200P
C307
200P
R408
30K
R406
270
R409
240K
C406
0.0022
C408
0.0082
1.9V
C402
0.001
C403
22P
0.6V
R403
100K
C404
4.7/10V
R402
3.3K
C401
10/16V
15.4V
R401
100K
R316
150K
R416
150K
R321
10
R318
15K
C310
4.7/50V
R317
82k
R415
39K
R315
39K
R604 100
R504 100
C506
0.01
C503 0.068
C502 0.0068
C603 0.068
C602 0.0068
C606
0.01
C605
150P
R605
33K
R505
33K
C505
150P
R502
5.6K
R602
5.6K
R503 56K
R603 56K
C504 0.01
C604 0.01
C501 0.0015
C601 0.0015
R501 4.7K
R601 4.7K
250K(B)
RV603
250K(B)
RV503
250K(S)
RV504
250K(A)
RV501
250K(A)
RV601
250K(A)
RV502
250K(A)
RV602
S5
S4
S3-5
S3-4
S3-3
S3-2
S3-1
11
VOLUME
BALANCE
BASS
TREBLE
MODE
MONITOR
CASSETTE
PHONO
FM
MW
LW

TA7122AP

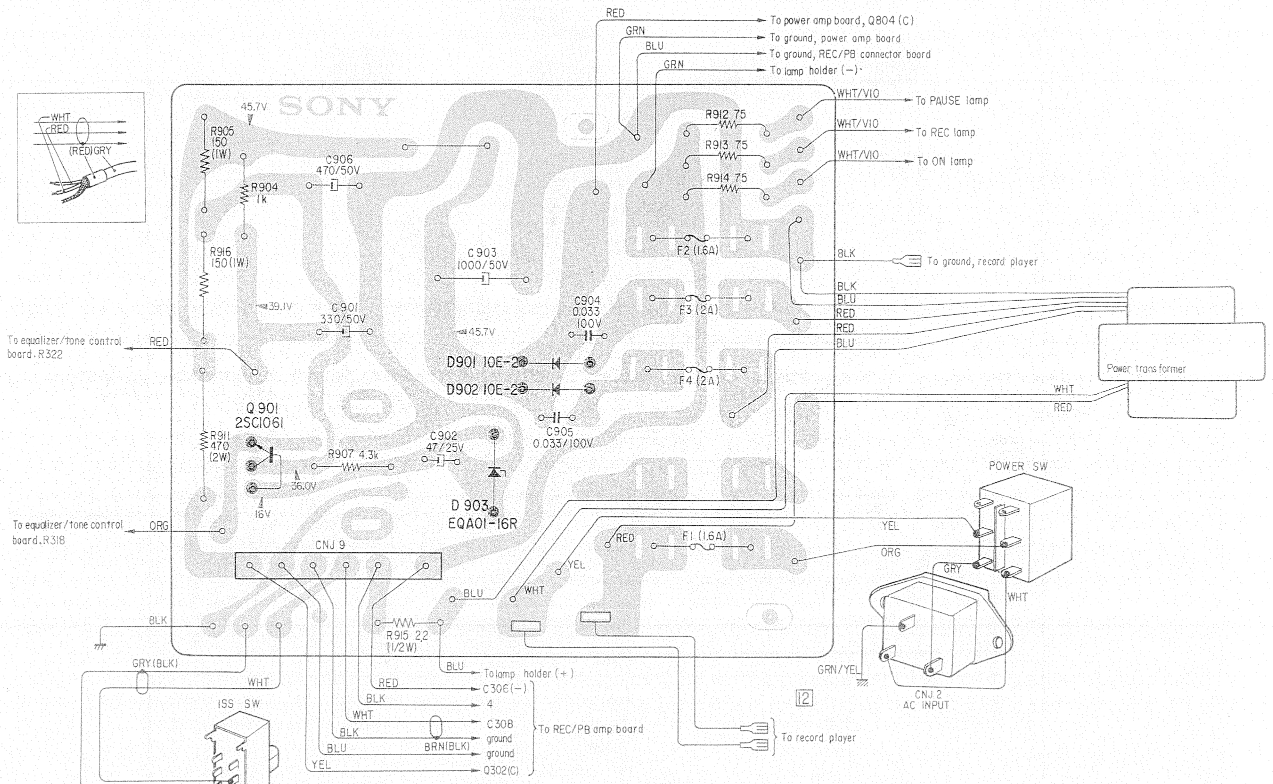


2SC945

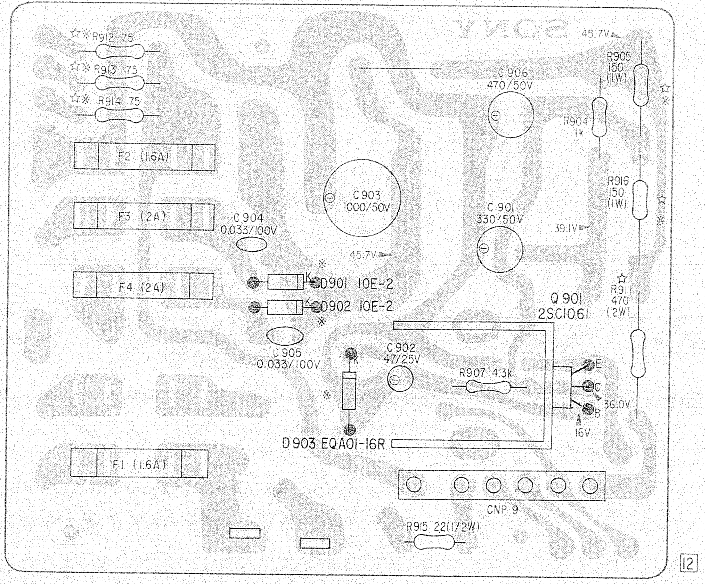


4-7. MOUNTING DIAGRAM – Power Supply Board –

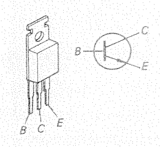
– Conductor Side –


RED
GRN
BLU
GRN
To power amp board, Q804 (C)
To ground, power amp board
To ground, REC/PB connector board
To lamp holder (−)
WHT
RED
(RED)GRY
45.7V
SONY
R905 150 (1W)
C906 470/50V
R904 1k
R912 75
R913 75
R914 75
WHT/VIO
WHT/VIO
WHT/VIO
To PAUSE lamp
To REC lamp
To ON lamp
R916 150 (1W)
C903 1000/50V
F2 (1.6A)
BLK
To ground, record player
39.1V
C901 330/50V
C904 0.033 100V
F3 (2A)
BLK
BLU
RED
RED
BLU
To equalizer/tone control board-R322
RED
45.7V
D901 10E-2
D902 10E-2
F4 (2A)
Power trans former
WHT
RED
Q901 2SC1061
R911 470 (2W)
R907 4.3k
C902 47/25V
C905 0.033/100V
36.0V
16V
D903 EQA01-16R
POWER SW
To equalizer/tone control board-R318
ORG
CNJ 9
RED
F1 (1.6A)
YEL
YEL
ORG
GRY
BLU
WHT
WHT
BLK
R915 22 (1/2W)
GRY (BLK)
WHT
ISS SW
BLU
To lamp holder (+)
RED
C306 (−)
BLK
4
WHT
C308
BLK
ground
To REC/PB amp board
BLU
BRN(BLK)
ground
YEL
Q302(C)
GRN/YEL
CNJ 2 AC INPUT
12
To record player

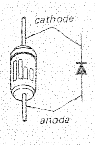
– Component Side –


☆※R912 75
☆※R913 75
☆※R914 75
SONY
45.7V
R905 150 (1W)
C906 470/50V
R904 1k
F2 (1.6A)
C903 1000/50V
R916 150 (1W)
F3 (2A)
C904 0.033/100V
C901 330/50V
39.1V
45.7V
F4 (2A)
D901 10E-2
D902 10E-2
Q901 2SC1061
R911 470 (2W)
C905 0.033/100V
C902 47/25V
R907 4.3k
E
C
B
36.0V
16V
D903 EQA01-16R
F1 (1.6A)
CNP 9
R915 22(1/2W)
12

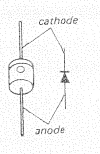
2SC1061



EQA01-16R


cathode
anode

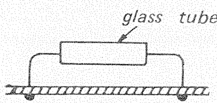
10D-2 (10E-2)

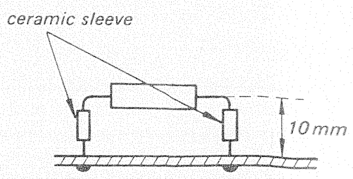

cathode
anode

Note:

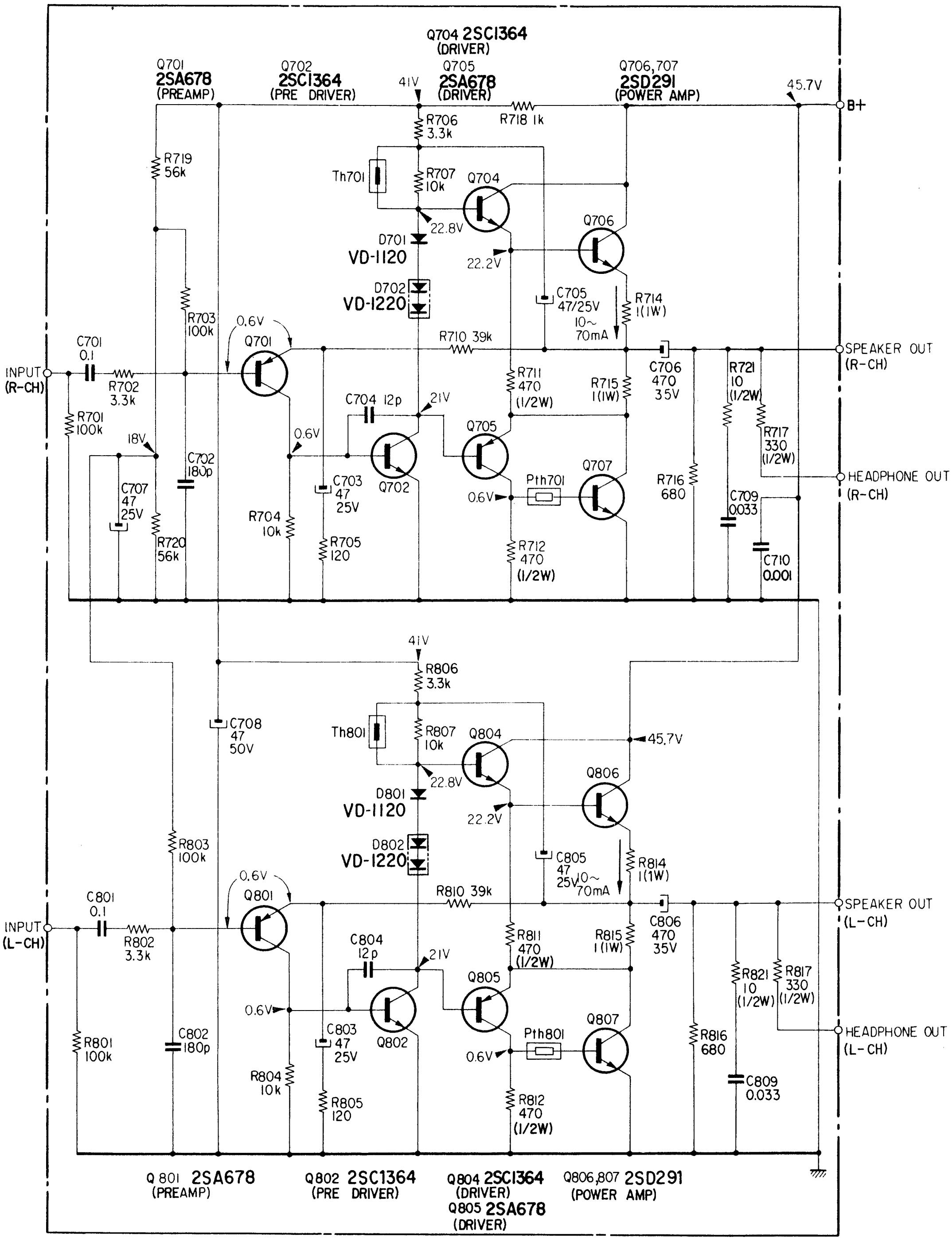
The parts marked (☆) must be put in the glass tubes above the circuit board.

The parts marked (※) must be mounted 10mm above the circuit board with ceramic sleeves.




ceramic sleeve
10mm

4-8. SCHEMATIC DIAGRAM – Power Amplifier Section –



Q704 2SC1364
(DRIVER)
Q705
2SA678
(DRIVER)
Q701
2SA678
(PREAMP)
Q702
2SC1364
(PRE DRIVER)
41V
Q706,707
2SD291
(POWER AMP)
45.7V
B+
R706
3.3k
R718 1k
R719
56k
Th701
R707
10k
Q704
22.8V
D701
VD-1120
22.2V
Q706
D702
VD-1220
C705
47/25V
10~
70mA
R714
1(1W)
R703
100k
0.6V
Q701
C701
0.1
R710 39k
INPUT
(R-CH)
R702
3.3k
R711
470
(1/2W)
R715
1(1W)
C706
470
35V
R721
10
(1/2W)
SPEAKER OUT
(R-CH)
R701
100k
C704 12p
21V
18V
0.6V
Q705
R717
330
(1/2W)
C702
180p
C707
47
25V
C703
47
25V
Q702
Pth701
Q707
0.6V
R716
680
HEADPHONE OUT
(R-CH)
C709
0.033
R704
10k
R720
56k
R705
120
R712
470
(1/2W)
C710
0.001
41V
R806
3.3k
C708
47
50V
Th801
R807
10k
Q804
45.7V
22.8V
Q806
D801
VD-1120
22.2V
R803
100k
D802
VD-1220
C805
47
25V
10~
70mA
R814
1(1W)
0.6V
Q801
R810 39k
C801
0.1
INPUT
(L-CH)
R802
3.3k
C804
12p
21V
R811
470
(1/2W)
R815
1(1W)
C806
470
35V
SPEAKER OUT
(L-CH)
Q805
R821
10
(1/2W)
R817
330
(1/2W)
0.6V
C803
47
25V
Q802
Pth801
Q807
HEADPHONE OUT
(L-CH)
R801
100k
C802
180p
0.6V
R816
680
R804
10k
R805
120
R812
470
(1/2W)
C809
0.033
Q801 2SA678
(PREAMP)
Q802 2SC1364
(PRE DRIVER)
Q804 2SC1364
(DRIVER)
Q805 2SA678
(DRIVER)
Q806,807 2SD291
(POWER AMP)

Note:

All resistance values are in ohms. k = 1,000 M = 1,000 k

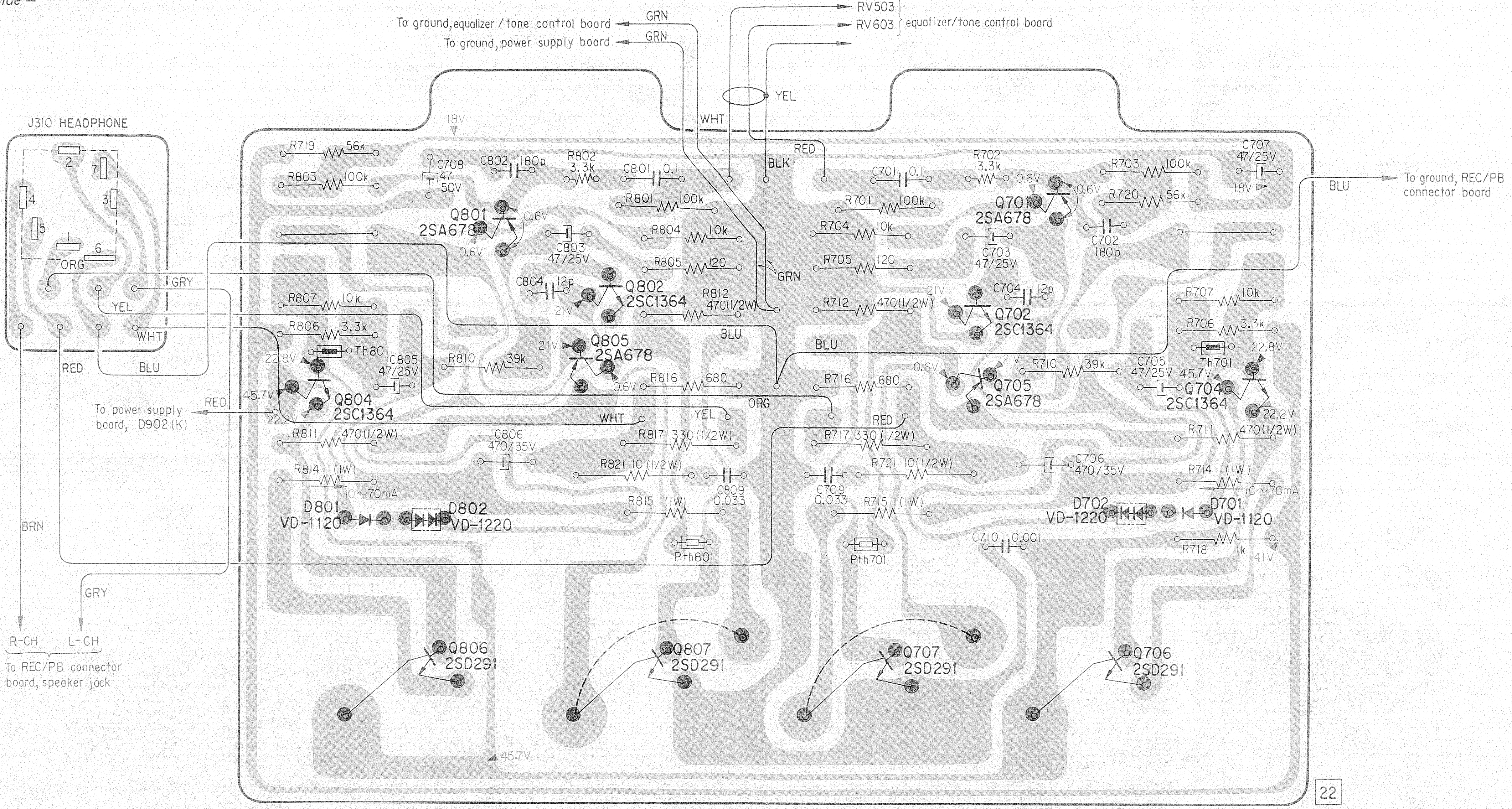
All capacitance values are in μF except as indicated with p, which means $\mu\mu$F.

All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.

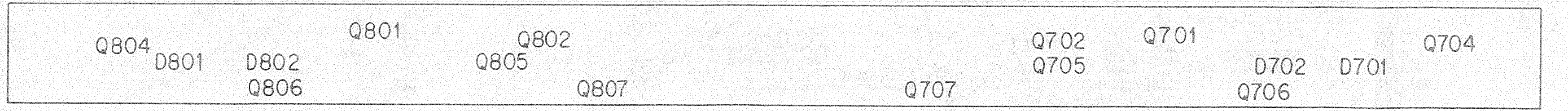
Voltage variations may be noted because of normal production tolerances.

4-9. MOUNTING DIAGRAM – Power Amplifier Board –

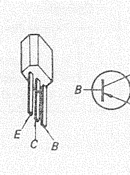
– Conductor Side –


To ground, equalizer / tone control board
To ground, power supply board
GRN
GRN
RV503
RV603
equalizer/tone control board
YEL
WHT
BLK
RED
J310 HEADPHONE
ORG
GRY
YEL
WHT
RED
BLU
BRN
GRY
R-CH
L-CH
To REC/PB connector board, speaker jack
To power supply board, D902(K)
To ground, REC/PB connector board
18V
R719 56k
R803 100k
C708 47 50V
C802 180p
R802 3.3k
C801 0.1
R801 100k
Q801 2SA678
0.6V
C803 47/25V
R804 10k
R805 120
C804 12p
Q802 2SC1364
R812 470(1/2W)
21V
R807 10k
R806 3.3k
Th801
C805 47/25V
R810 39k
Q805 2SA678
22.8V
45.7V
22.2V
Q804 2SC1364
R816 680
R811 470(1/2W)
C806 470/35V
R817 330(1/2W)
R821 10(1/2W)
R814 1(1W)
10~70mA
C809 0.033
R815 1(1W)
D801 VD-1120
D802 VD-1220
Pth801
C701 0.1
R702 3.3k
R703 100k
C707 47/25V
R701 100k
Q701 2SA678
R720 56k
R704 10k
C703 47/25V
C702 180p
R705 120
R712 470(1/2W)
C704 12p
Q702 2SC1364
R707 10k
R706 3.3k
Th701
R716 680
R710 39k
Q705 2SA678
C705 47/25V
Q704 2SC1364
R717 330(1/2W)
R711 470(1/2W)
C709 0.033
R721 10(1/2W)
C706 470/35V
R714 1(1W)
R715 1(1W)
D702 VD-1220
D701 VD-1120
C710 0.001
R718 1k
41V
Pth701
Q806 2SD291
Q807 2SD291
Q707 2SD291
Q706 2SD291
45.7V
22

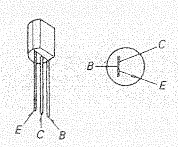
Semiconductors Location


Q804
D801
D802
Q806
Q801
Q802
Q805
Q807
Q707
Q702
Q705
Q701
D702
Q706
D701
Q704

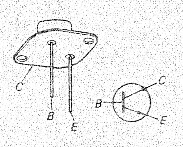
2SA678



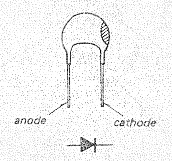
2SC1364



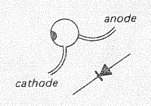
2SD291



VD-1120

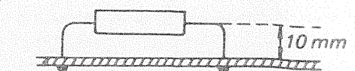

anode
cathode

VD-1220


anode
cathode

Note:

1. Th701 and Th801 should be in direct contact with R714 and R814 respectively. Fix them in place by applying contact cement.
2. D701, D702, D801, and D802 should be in direct contact with the heat sink. Apply contact cement to fix them in place.
3. Pth701 and Pth801 should be in direct contact with R715 and R815. Apply contact cement to fix them in place.
4. R711, R712, R714, R715, R811, R812, R814, and R815 are the fuse-type resistors. They must be mounted 10 mm above the circuit board and, furthermore, no lead wire should go over them.

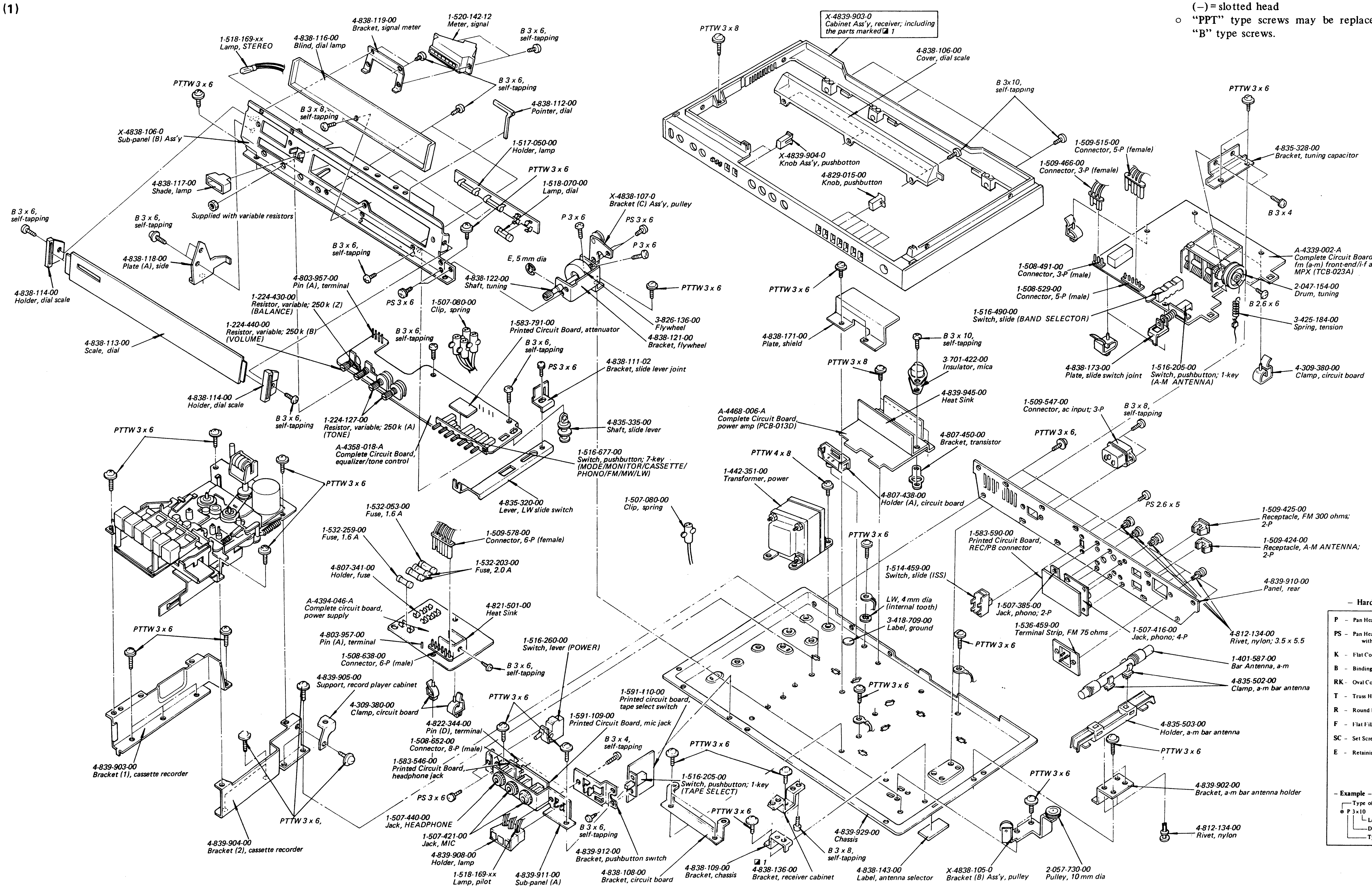


SECTION 5
EXPLODED VIEWS

Note:

- o Items without part number and description are not available.
- o All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- o "PPT" type screws may be replaced with "B" type screws.

(1)


1-518-169-xx
Lamp, STEREO
4-838-116-00
Blind, dial lamp
4-838-119-00
Bracket, signal meter
1-520-142-12
Meter, signal
B 3 x 6,
self-tapping
B 3 x 6,
self-tapping
PTTW 3 x 6
B 3 x 8,
self-tapping
4-838-112-00
Pointer, dial
X-4838-106-0
Sub-panel (B) Ass'y
1-517-050-00
Holder, lamp
PTTW 3 x 6
1-518-070-00
Lamp, dial
4-838-117-00
Shade, lamp
Supplied with variable resistors
B 3 x 6,
self-tapping
B 3 x 6,
self-tapping
B 3 x 6,
self-tapping
4-838-118-00
Plate (A), side
4-838-114-00
Holder, dial scale
4-803-957-00
Pin (A), terminal
1-224-430-00
Resistor, variable; 250 k (Z)
(BALANCE)
PS 3 x 6
1-507-080-00
Clip, spring
1-224-440-00
Resistor, variable; 250 k (B)
(VOLUME)
B 3 x 6,
self-tapping
4-838-113-00
Scale, dial
4-838-114-00
Holder, dial scale
B 3 x 6,
self-tapping
1-224-127-00
Resistor, variable; 250 k (A)
(TONE)
A-4358-018-A
Complete Circuit Board,
equalizer/tone control
X-4838-107-0
Bracket (C) Ass'y, pulley
P 3 x 6
PS 3 x 6
P 3 x 6
E, 5 mm dia
4-838-122-00
Shaft, tuning
PTTW 3 x 6
3-826-136-00
Flywheel
4-838-121-00
Bracket, flywheel
1-583-791-00
Printed Circuit Board, attenuator
B 3 x 6,
self-tapping
PS 3 x 6
4-838-111-02
Bracket, slide lever joint
4-835-335-00
Shaft, slide lever
1-516-677-00
Switch, pushbutton; 7-key
(MODE/MONITOR/CASSETTE/
PHONO/FM/MW/LW)
4-835-320-00
Lever, LW slide switch
PTTW 3 x 6
PTTW 3 x 6
1-532-053-00
Fuse, 1.6 A
1-532-259-00
Fuse, 1.6 A
1-509-578-00
Connector, 6-P (female)
4-807-341-00
Holder, fuse
1-532-203-00
Fuse, 2.0 A
A-4394-046-A
Complete circuit board,
power supply
4-821-501-00
Heat Sink
4-803-957-00
Pin (A), terminal
1-508-638-00
Connector, 6-P (male)
B 3 x 6,
self-tapping
1-516-260-00
Switch, lever (POWER)
1-507-080-00
Clip, spring
PTTW 3 x 6
4-839-905-00
Support, record player cabinet
4-309-380-00
Clamp, circuit board
4-839-903-00
Bracket (1), cassette recorder
4-822-344-00
Pin (D), terminal
1-508-652-00
Connector, 8-P (male)
1-583-546-00
Printed Circuit Board,
headphone jack
PTTW 3 x 6
1-591-109-00
Printed Circuit Board, mic jack
1-591-110-00
Printed circuit board,
tape select switch
B 3 x 4,
self-tapping
PS 3 x 6
PTTW 3 x 6,
4-839-904-00
Bracket (2), cassette recorder
1-507-440-00
Jack, HEADPHONE
1-507-421-00
Jack, MIC
4-839-908-00
Holder, lamp
1-518-169-xx
Lamp, pilot
4-839-911-00
Sub-panel (A)
B 3 x 6,
self-tapping
4-839-912-00
Bracket, pushbutton switch
4-838-108-00
Bracket, circuit board
PTTW 3 x 6
1-516-205-00
Switch, pushbutton; 1-key
(TAPE SELECT)
PTTW 3 x 6
4-838-109-00
Bracket, chassis
1
4-838-136-00
Bracket, receiver cabinet
B 3 x 8,
self-tapping
4-839-929-00
Chassis
4-838-143-00
Label, antenna selector
X-4838-105-0
Bracket (B) Ass'y, pulley
2-057-730-00
Pulley, 10 mm dia
PTTW 3 x 8
X-4839-903-0
Cabinet Ass'y, receiver; including
the parts marked 1
4-838-106-00
Cover, dial scale
B 3x10,
self-tapping
X-4839-904-0
Knob Ass'y, pushbotton
4-829-015-00
Knob, pushbutton
PTTW 3 x 6
4-838-171-00
Plate, shield
B 3 x 10,
self-tapping
PTTW 3 x 8
3-701-422-00
Insulator, mica
4-839-945-00
Heat Sink
A-4468-006-A
Complete Circuit Board,
power amp (PCB-013D)
4-807-450-00
Bracket, transistor
PTTW 4 x 8
1-442-351-00
Transformer, power
4-807-438-00
Holder (A), circuit board
PTTW 3 x 6
1-514-459-00
Switch, slide (ISS)
LW, 4 mm dia
(internal tooth)
3-418-709-00
Label, ground
PTTW 3 x 6
PTTW 3 x 6
PTTW 3 x 6
1-509-515-00
Connector, 5-P (female)
1-509-466-00
Connector, 3-P (female)
PTTW 3 x 6
4-835-328-00
Bracket, tuning capacitor
B 3 x 4
1-508-491-00
Connector, 3-P (male)
1-508-529-00
Connector, 5-P (male)
A-4339-002-A
Complete Circuit Board,
fm (a-m) front-end/i-f amp/
MPX (TCB-023A)
2-047-154-00
Drum, tuning
B 2.6 x 6
1-516-490-00
Switch, slide (BAND SELECTOR)
3-425-184-00
Spring, tension
4-838-173-00
Plate, slide switch joint
1-516-205-00
Switch, pushbutton; 1-key
(A-M ANTENNA)
4-309-380-00
Clamp, circuit board
1-509-547-00
Connector, ac input; 3-P
B 3 x 8,
self-tapping
PTTW 3 x 6,
PS 2.6 x 5
1-509-425-00
Receptacle, FM 300 ohms;
2-P
1-509-424-00
Receptacle, A-M ANTENNA;
2-P
1-583-590-00
Printed Circuit Board,
REC/PB connector
4-839-910-00
Panel, rear
1-507-385-00
Jack, phono; 2-P
1-536-459-00
Terminal Strip, FM 75 ohms
1-507-416-00
Jack, phono; 4-P
4-812-134-00
Rivet, nylon; 3.5 x 5.5
1-401-587-00
Bar Antenna, a-m
4-835-502-00
Clamp, a-m bar antenna
4-835-503-00
Holder, a-m bar antenna
PTTW 3 x 6
4-839-902-00
Bracket, a-m bar antenna holder
PTTW 3 x 6
4-812-134-00
Rivet, nylon

– Hardware Nomenclature –

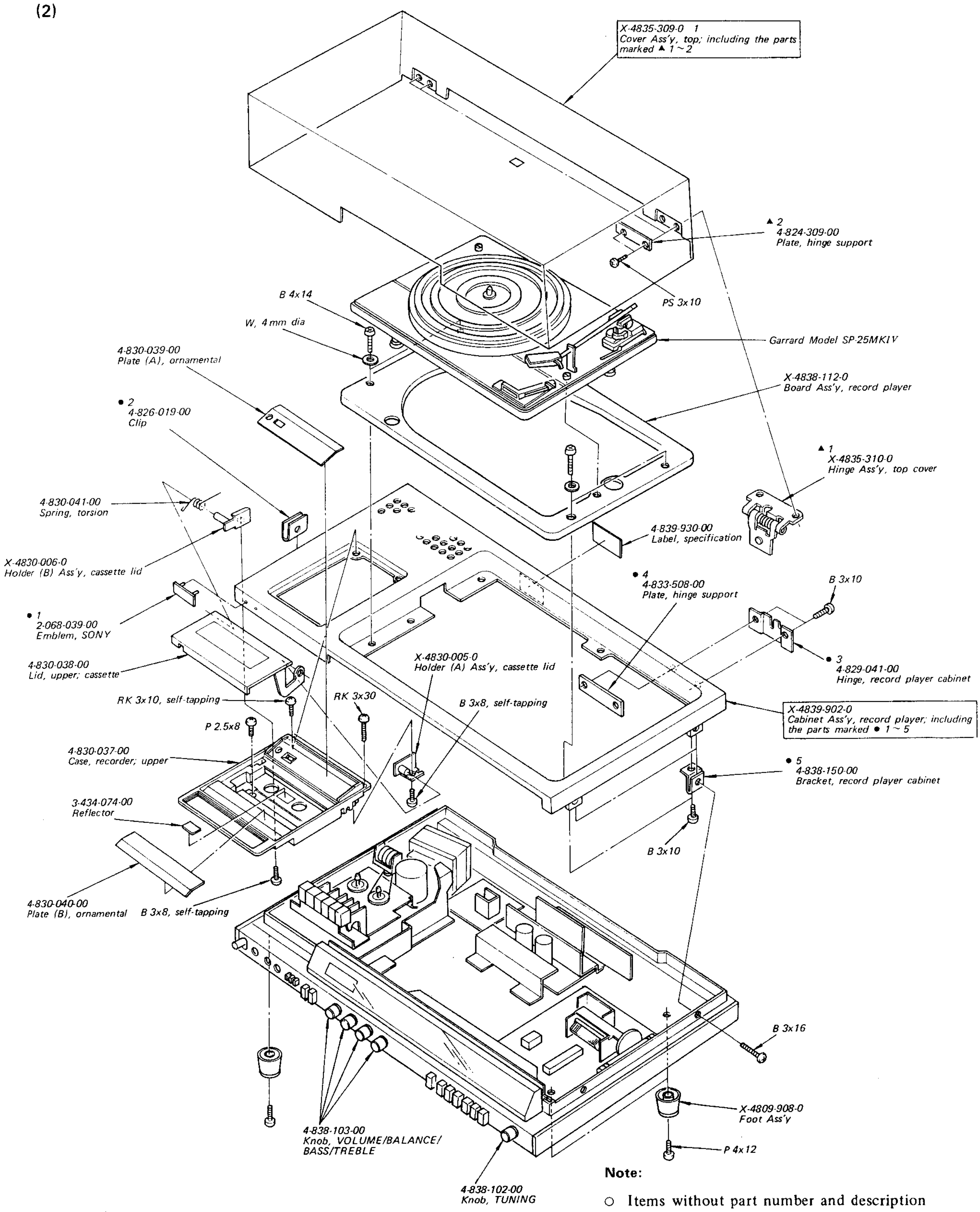
P – Pan Head Screw
PS – Pan Head Screw with Spring Washer
K – Flat Countersunk Head Screw
B – Binding Head Screw
RK – Oval Countersunk Head Screw
T – Truss Head Screw
R – Round Head Screw
F – Flat Fillister Head Screw
SC – Set Screw
E – Retaining Ring (E-Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

– Example –

⊕ P 3×10
- Type of Slot
- Type of Head
- Diameter in mm (D)
- Length in mm (L)

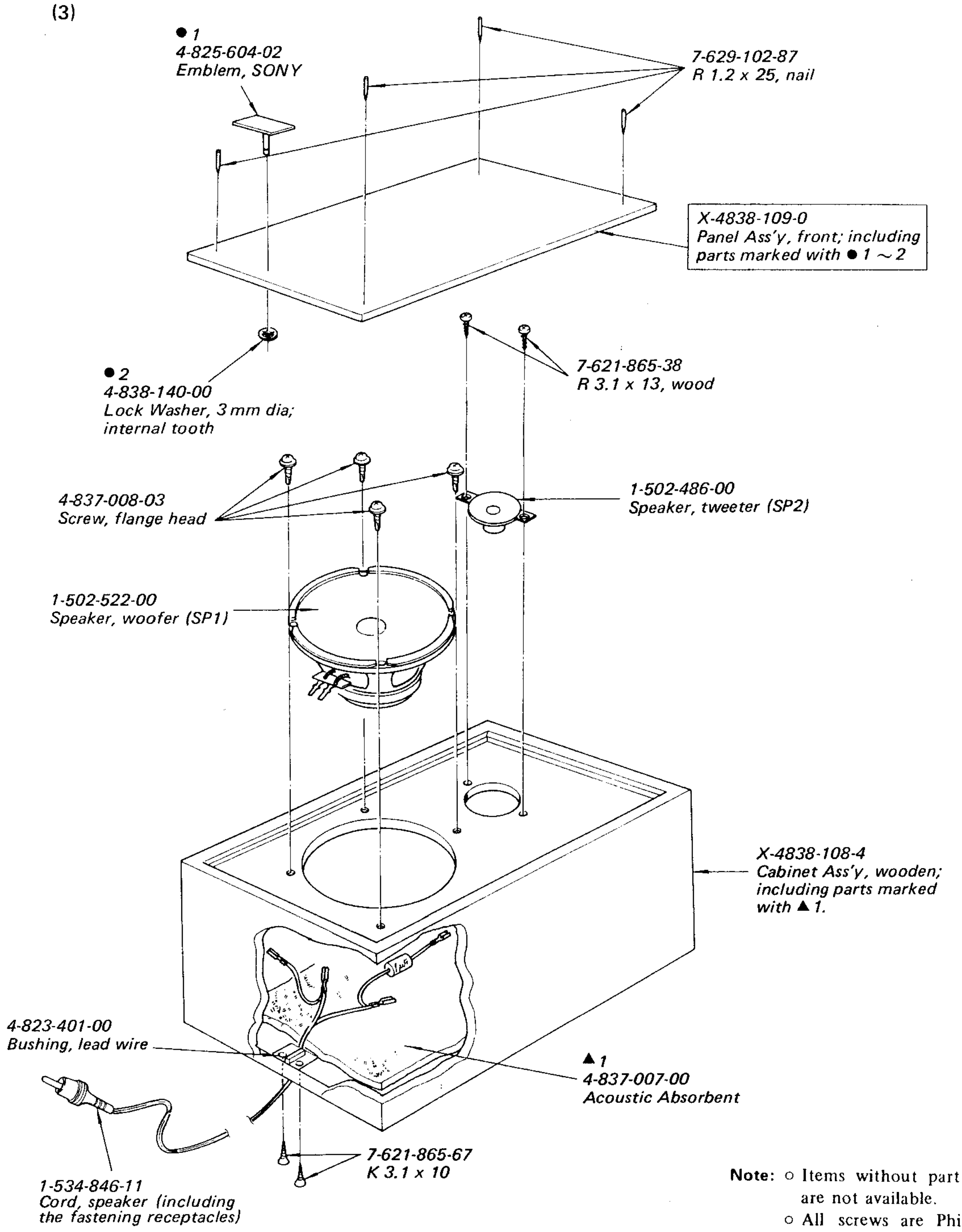
(2)


X-4835-309-0 1
Cover Ass'y, top; including the parts marked ▲ 1 ~ 2
▲ 2
4-824-309-00
Plate, hinge support
PS 3x10
B 4x14
W, 4mm dia
Garrard Model SP-25MKIV
4-830-039-00
Plate (A), ornamental
X-4838-112-0
Board Ass'y, record player
● 2
4-826-019-00
Clip
▲ 1
X-4835-310-0
Hinge Ass'y, top cover
4-830-041-00
Spring, torsion
4-839-930-00
Label, specification
X-4830-006-0
Holder (B) Ass'y, cassette lid
● 4
4-833-508-00
Plate, hinge support
B 3x10
● 1
2-068-039-00
Emblem, SONY
● 3
4-829-041-00
Hinge, record player cabinet
4-830-038-00
Lid, upper; cassette
X-4830-005-0
Holder (A) Ass'y, cassette lid
RK 3x10, self-tapping
RK 3x30
B 3x8, self-tapping
X-4839-902-0
Cabinet Ass'y, record player; including the parts marked ● 1 ~ 5
P 2.5x8
4-830-037-00
Case, recorder; upper
● 5
4-838-150-00
Bracket, record player cabinet
3-434-074-00
Reflector
B 3x10
4-830-040-00
Plate (B), ornamental
B 3x8, self-tapping
B 3x16
X-4809-908-0
Foot Ass'y
P 4x12
4-838-103-00
Knob, VOLUME/BALANCE/BASS/TREBLE
4-838-102-00
Knob, TUNING

Note:

- ○ Items without part number and description are not available.
- ○ All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

(3)


●1
4-825-604-02
Emblem, SONY
7-629-102-87
R 1.2 x 25, nail
X-4838-109-0
Panel Ass'y, front; including parts marked with ● 1 ~ 2
●2
4-838-140-00
Lock Washer, 3 mm dia; internal tooth
7-621-865-38
R 3.1 x 13, wood
4-837-008-03
Screw, flange head
1-502-486-00
Speaker, tweeter (SP2)
1-502-522-00
Speaker, woofer (SP1)
X-4838-108-4
Cabinet Ass'y, wooden; including parts marked with ▲1.
4-823-401-00
Bushing, lead wire
▲1
4-837-007-00
Acoustic Absorbent
7-621-865-67
K 3.1 x 10
1-534-846-11
Cord, speaker (including the fastening receptacles)

Note:
- ○ Items without part number and description are not available.
- ○ All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head

REPACKING PARTS LIST (SPEAKER SECTION)

Part No.	*Description*
4-838-205-00	Carton
4-838-164-00	Cushion
4-837-003-00	Bag, polyethylene
4-838-163-00	Spacer

SECTION 6
ELECTRICAL PARTS LIST

CIRCUIT BOARDS

Ref. No.	Part No.	Description
	A-4339-002-A	Fm (A-m) Front-end/I-f Amp/MPX (TCB-023A), complete
	A-4358-017-A	Equalizer/Tone Control, complete
	1-591-109-00	MIC Jack
	A-4394-045-A	Power Supply, complete
	A-4468-006-A	Power Amp (PCB-013D), complete
	1-583-590-00	REC/PB Connector
	1-583-791-00	Attenuator
	1-583-546-00	Headphone Jack

SEMICONDUCTORS

Ref. No.	Part No.	Description	
Q001		FET	2SK23A
Q002		Transistor	2SC710
Q003		Transistor	2SC710
Q051		Transistor	2SC710
Q101 ~ Q104		Transistor	2SC710
Q105		Transistor	2SC403C
Q106		Transistor	2SC634A
Q301		Transistor	2SC945
Q701(Q801)		Transistor	2SA678
Q702(Q802)		Transistor	2SC1364
Q704(Q804)		Transistor	2SC1364
Q705(Q805)		Transistor	2SA678
Q706(Q806)		Transistor	2SD291
Q707(Q807)		Transistor	2SD291
Q901		Transistor	2SC1061
IC201		IC	CX-0431
IC301(IC401)		IC	TA-7122AP
D001		Diode	1S351M
D102		Diode	1T22A
D103		Diode	1T22A
D104		Diode	1T22A
D105		Diode	1T22A
D106		Diode	1T22A
D107		Diode	1S1555
D108		Diode	1T23
D109		Diode	1S1555
D110		Diode	1S1555
D701(D801)		Diode	VD1120
D702(D802)		Diode	VD1220
D901(D902)		Diode	10E-2
D903		Diode	EQA01-16R
Ph701 (Ph801)	1-800-076-00	Thermistor (positive)	
Th701 (Th801)	1-800-077-00	Thermistor	

TRANSFORMERS, COILS AND INDUCTORS

Ref. No.	Part No.	Description
CFU101	1-403-830-00	I-f Transformer/Ceramic Filter, 455 kHz
IFT001	1-403-821-00	Transformer, i-f; 10.7 MHz
IFT101	1-403-820-00	Transformer, i-f; 455 kHz
IFT102	1-403-822-00	Transformer, discriminator
L001	1-425-814-00	Coil, fm antenna
L002	1-405-628-00	Coil, fm osc
L003	1-425-815-00	Coil, fm rf
L051	1-405-555-00	Coil, lw osc
L052	1-405-556-00	Coil, mw osc
L053	1-401-586-00	Coil, external antenna
L054	1-407-169-00	Inductor, micro; 100 μH
L055	1-401-587-00	Bar Antenna, a-m
L102	1-407-418-00	Inductor, shielded; 22 mH
L201	1-425-729-00	Transformer, switching; 38 kHz
MU201	1-464-009-00	Unit, MPX
T	1-442-392-00	Transformer, power
TRP101	1-409-274-00	Coil, trap
	1-417-014-31	Balun

CAPACITORS

Capacitors listed here are 50 V, ceramic type unless otherwise specified and in μF except as indicated with p (p means μμ). (elect = electrolytic)

Ref. No.	*Part No.*	*Description*		
C001	1-102-960-11	24 p		
C002	1-102-959-11	22 p		
C003	1-101-118-11	0.01		
C004	1-101-118-11	0.01		
C005	1-101-923-11	0.01	25 V	
C006	1-102-978-11	220 p		
C007	1-101-924-11	0.022	25 V	
C008	1-101-118-11	0.01		
C009	1-101-924-11	0.022	25 V	
C010	1-101-924-11	0.022	25 V	
C011	1-121-409-11	47	16 V	elect
C012	1-101-978-11	10 p		
C013	1-101-978-11	10 p		
C014	1-101-972-11	18 p		
C015	1-102-858-11	10 p		
C017	1-101-923-11	0.01	25 V	
C018	1-101-924-11	0.022	25 V	
C051	1-105-669-12	0.0047	50 V	mylar
C052	1-105-669-12	0.0047	50 V	mylar
C053	1-105-667-12	0.0033	50 V	mylar
C054	1-102-824-11	470 p		
C055	1-102-958-11	20 p		
C056	1-102-936-11	3 p		
C057	1-102-808-11	6 p		
C058	1-102-958-11	20 p		
C059	1-102-981-11	300 p		
C060	1-102-958-11	20 p		
C061	1-102-947-11	10 p		
C062	1-101-361-11	150 p		
C063	1-101-882-11	51 p		
C064	1-102-942-11	5 p		
C065	1-101-924-11	0.022	25 V	
C066	1-105-673-12	0.01	50 V	mylar
C067	1-121-395-11	4.7	25 V	elect
C068	1-101-924-11	0.022	25 V	
C069	1-121-398-11	10	25 V	elect
C101	1-101-919-11	0.0022	25 V	
C102	1-105-667-12	0.0033	50 V	mylar
C103	1-101-923-11	0.01	25 V	
C104	1-121-398-11	10	25 V	elect
C105	1-105-667-12	0.0033	50 V	mylar
C107	1-127-020-11	0.22	10 V	solid aluminum
C108	1-121-395-11	4.7	25 V	elect
C109	1-101-923-11	0.01	25 V	
C110	1-127-023-11	1	10 V	solid aluminum
C111	1-101-924-11	0.022	25 V	
C112	1-101-924-11	0.022	25 V	
C114	1-102-973-11	100 p		
C115	1-121-398-11	10	25 V	elect
C116	1-102-979-11	240 p		
C117	1-107-140-11	240 p	50 V	silvered mica
C118	1-121-398-11	10	25 V	elect
C120	1-121-395-11	4.7	25 V	elect
C121	1-101-923-11	0.01	25 V	
C122	1-105-679-12	0.033	50 V	mylar
C123	1-121-398-11	10	25 V	elect
C125	1-121-398-11	10	25 V	elect
C126	1-101-924-11	0.022	25 V	
C127	1-101-924-11	0.022	25 V	
C131	1-121-391-11	1	50 V	elect
C133	1-101-884-11	56 p		
C134	1-101-924-11	0.022	25 V	
C135	1-101-924-11	0.022	25 V	
C136	1-105-677-12	0.022	50 V	mylar
C137	1-105-683-12	0.068	50 V	mylar
C138	1-102-947-11	10 p		
C139	1-101-923-11	0.01	25 V	
C140	1-127-019-11	0.1	10 V	solid aluminum
C141	1-121-413-11	100	6.3 V	elect
C150	1-101-923-11	0.01	25 V	
C201	1-121-402-11	33	10 V	elect
C202	1-121-726-11	0.47	50 V	elect
C203	1-127-022-11	0.47	10 V	solid aluminum

Ref. No.	*Part No.*	*Description*		
C206	1-103-575-11	4700 p	50 V	styrol
C207	1-121-410-11	47	25 V	elect
C208	1-103-717-11	470 p	50 V	styrol
C209	1-121-410-11	47	25 V	elect
C210	1-121-911-11	0.47	50 V	elect
C211	1-121-911-11	0.47	50 V	elect
C212	1-105-665-12	0.0022	50 V	mylar
C213	1-105-665-12	0.0022	50 V	mylar
C301(C401)	1-121-651-11	10	16 V	elect
C302(C402)	1-105-661-12	0.001	50 V	mylar
C303(C403)	1-102-967-11	22 p		
C304(C404)	1-121-352-11	47	10 V	elect
C305(C405)	1-121-450-11	2.2	50 V	elect
C306(C406)	1-105-505-12	0.0022	50 V	mylar
C307(C407)	1-102-977-11	200 p		
C308(C408)	1-105-512-12	0.0082	50 V	mylar
C309	1-121-396-11	4.7	50 V	elect
C310	1-121-396-11	4.7	50 V	elect
C311	1-121-450-11	2.2	50 V	elect
C312	1-121-411-11	47	50 V	elect
C501(C601)	1-105-663-12	0.0015	50 V	mylar
C502(C602)	1-105-671-12	0.0068	50 V	mylar
C503(C603)	1-105-683-12	0.068	50 V	mylar
C504(C604)	1-105-673-12	0.01	50 V	mylar
C505(C605)	1-107-135-11	150 p	50 V	silvered mica
C506(C606)	1-105-673-12	0.01	50 V	mylar
C701(C801)	1-108-251-12	0.1	50 V	mylar
C702(C802)	1-102-976-11	180 p		
C703(C803)	1-121-410-11	47	25 V	elect
C704(C804)	1-102-949-11	12 p		
C705(C805)	1-121-410-11	47	25 V	elect
C706(C806)	1-121-941-11	470	35 V	elect
C707	1-121-410-11	47	25 V	elect
C708	1-123-058-11	47	50 V	elect
C709(C809)	1-108-244-12	0.033	50 V	mylar
C710	1-108-227-12	0.001	50 V	mylar

Ref. No.	*Part No.*	*Description*		
C901	1-121-656-11	330	50 V	elect
C902	1-121-410-11	47	25 V	elect
C903	1-125-081-11	1000	50 V	elect
C904	1-105-719-12	0.033	100 V	mylar
C905	1-105-719-12	0.033	100 V	mylar
C906	1-121-810-11	470	50 V	elect
CV001 ~ CV003 CV051, CV052	1-151-281-00	Tuning		
CT051 ~ CT054	1-141-097-00	Trimmer		

RESISTORS

All resistors are in Ω. ¼W, ±5% carbon or composition resistors (except special type) are omitted.
Check schematic diagram for the resistance values.
k = 1000, M = 1000 k

Ref. No.	*Part No.*	*Description*		
R156	1-202-569-11	680	½W	composition
R201	1-202-561-11	330	½W	composition
R711(R811)	1-212-998-11	470	½W	metal-oxide (fuse type)
R712(R812)	1-212-998-11	470	½W	metal-oxide (fuse type)
R714(R814)	1-213-036-11	1	1W	metal-oxide (fuse type)
R715(R815)	1-213-036-11	1	1 W	metal-oxide (fuse type)
R717(R817)	1-202-561-11	330	½W	composition
R721(R821)	1-202-525-11	10	½W	composition
R905,916	1-213-088-11	150	1W	metal-oxide (fuse type)
R908	1-202-537-11	33	½W	composition
R911	1-206-656-11	470	2W	metal-oxide
R915	1-212-942-11	2.2	½W	metal-oxide (fuse type)
RV501 (RV601)	1-224-127-00	250 k (A), variable (BASS)		
RV502 (RV602)	1-224-127-00	250 k (A), variable (TREBLE)		
RV503 (RV603)	1-224-440-00	250 k (B), variable (VOLUME)		
RV504	1-224-430-00	250 k (S), variable (BALANCE)		

SWITCHES

Ref. No.	*Part No.*	*Description*
S1	1-516-205-00	Pushbutton, 1-key (A-M ANTENNA)
S2	1-516-490-00	Slide (BAND SELECTOR)
S3 ~ S5	1-516-677-00	Pushbutton, 7-key (LW, MW, FM, PHONO, CASSETTE, MONITOR, MODE)
S6	1-516-260-00	Lever (POWER)
S7	1-514-459-00	Slide, ISS (BIAS FREQUENCY SELECTOR)

FILTERS

Ref. No.	*Part No.*	*Description*
CF101, 102	1-527-220-11	Fm I-f, ceramic; 10.70 MHz (red)
	1-527-220-21	Fm I-f, ceramic; 10.67 MHz (blue)
	1-527-220-31	Fm I-f, ceramic; 10.73 MHz (orange)
	1-527-220-41	Fm I-f, ceramic; 10.64 MHz (black)
	1-527-220-51	Fm I-f, ceramic; 10.76 MHz (white)

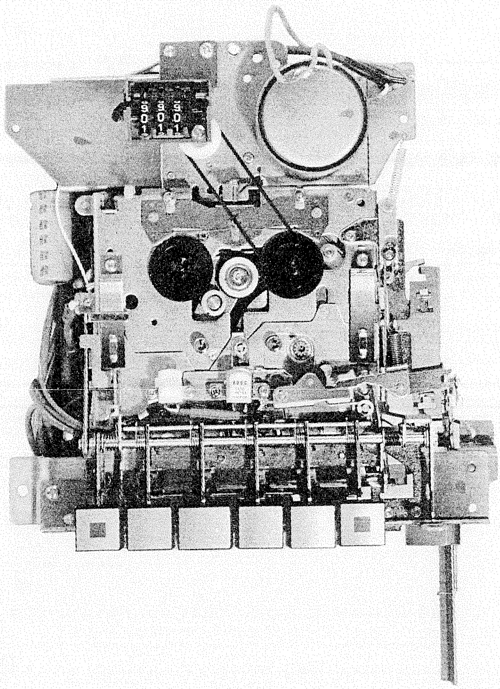
MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
CNJ1	1-509-508-00	Connector, REC/PB
CNJ2	1-509-547-00	Connector, ac input; 3-P
CNJ3	1-509-515-00	Connector, 5-P; female
CNJ4	1-509-466-00	Connector, 3-P; female
CNJ6	1-509-425-00	Receptacle, FM 300 ohms; 2-P
CNJ7	1-509-424-00	Receptacle, AM ANTENNA; 2-P
CNJ8	1-536-459-00	Terminal Strip (FM 75 ohms)
CNJ9	1-508-638-00	Connector, 6-P; male
CNJ10	1-508-652-00	Connector, 8-P; male
CNP101	1-508-491-00	Connector, 3-P; male
CNP102	1-508-529-00	Connector, 5-P; male
CR101	1-231-175-00	Encapsulated Component
CR201 CR202	1-231-224-00	Encapsulated Component
F1	1-532-259-00	Fuse, 1.6 A
F2	1-532-053-00	Fuse, 1.6 A
F3, F4	1-532-203-00	Fuse, 2.0A
F5	1-532-294-00	Fuse, 0.4 A
J301(J401) J302(J402)	1-507-416-00	Jack, phono; 4-P
J303(J403)	1-507-385-00	Jack, phono; 2-P
J310	1-507-440-00	Jack, HEADPHONE
M1	1-520-142-12	Meter, SIGNAL
PL1	1-518-176-91	Lamp, meter
PL2 ~ PL4	1-518-070-00	Lamp, dial
PL5	1-518-169-xx	Lamp, STEREO
	1-507-421-00	Jack, MIC
	1-508-704-00	Connector, 3-P; male
	1-509-578-00	Connector, 6-P; female
	1-517-050-00	Holder, dial lamp
	1-535-059-00	Lug, terminal
	1-535-095-00	Pin, terminal

ACCESSORIES & PACKING MATERIALS

Part No.	*Description*
X-3701-018-0	Cleaner Ass'y, head
1-501-149-00	Ribbon Antenna, fm
1-534-819-00	Cord, power
3-701-623-00	Bag, polyethylene; guarantee card
3-701-630-00	Bag, polyethylene; instruction manual
3-701-680-00	Label, tack
3-780-530-41	Manual, instruction
3-793-520-82	Card, guarantee
4-807-493-00	Cardboard, protection; motor board
4-838-160-00	Cardboard, protection; top cover
4-839-901-00	Bag, polyethylene; top cover
4-839-942-00	Cushion, receiver
4-839-943-00	Bag, polyethylene; receiver
4-839-945-00	Carton
4-839-946-00	Cushion, upper
4-839-947-00	Cushion, lower
4-890-502-00	Counterweight
4-890-581-00	Adaptor, manual; 45 rpm
4-890-582-00	Spindle

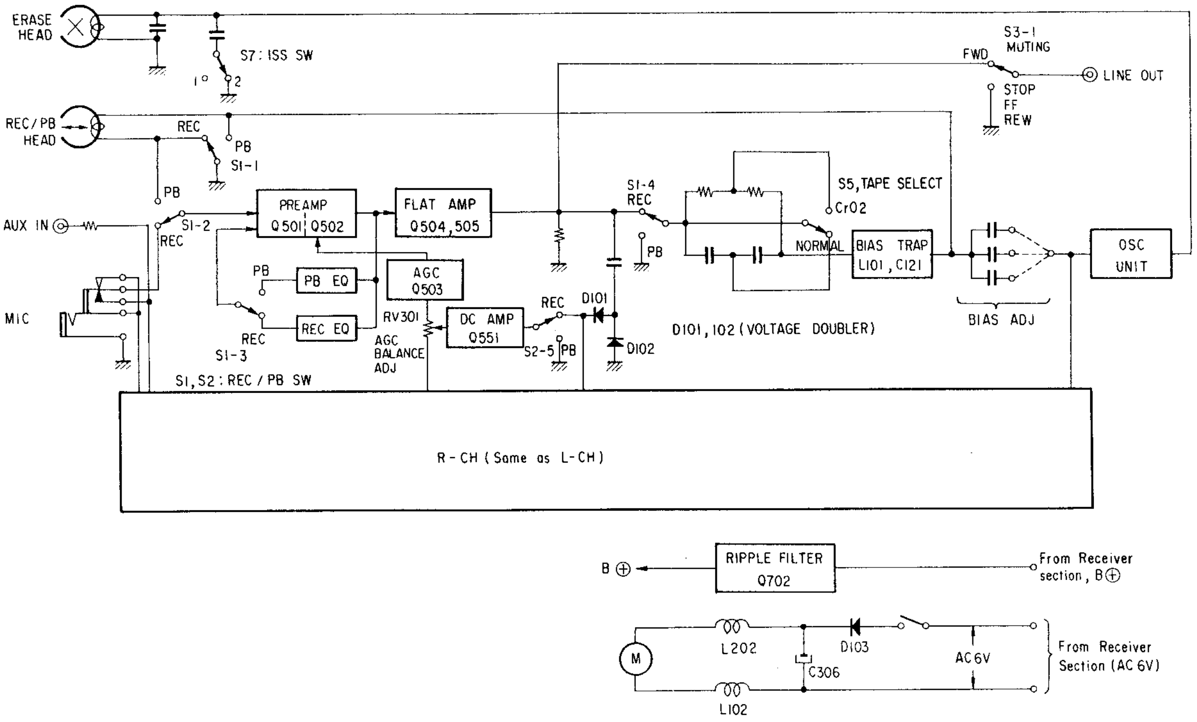
STEREO CASSETTE DECK SECTION



SPECIFICATIONS

Track:	4 track, 2 channel
Tape speed:	4.8 cm/sec (1 7/8 ips.)
Recording bias frequency:	84.5 kHz
Frequency response:	Normal 30 Hz to 13 kHz ± 15 dB CrO2 30 Hz to 17 kHz ± 15 dB
Wow and flutter:	Less than 0.22 % wrms

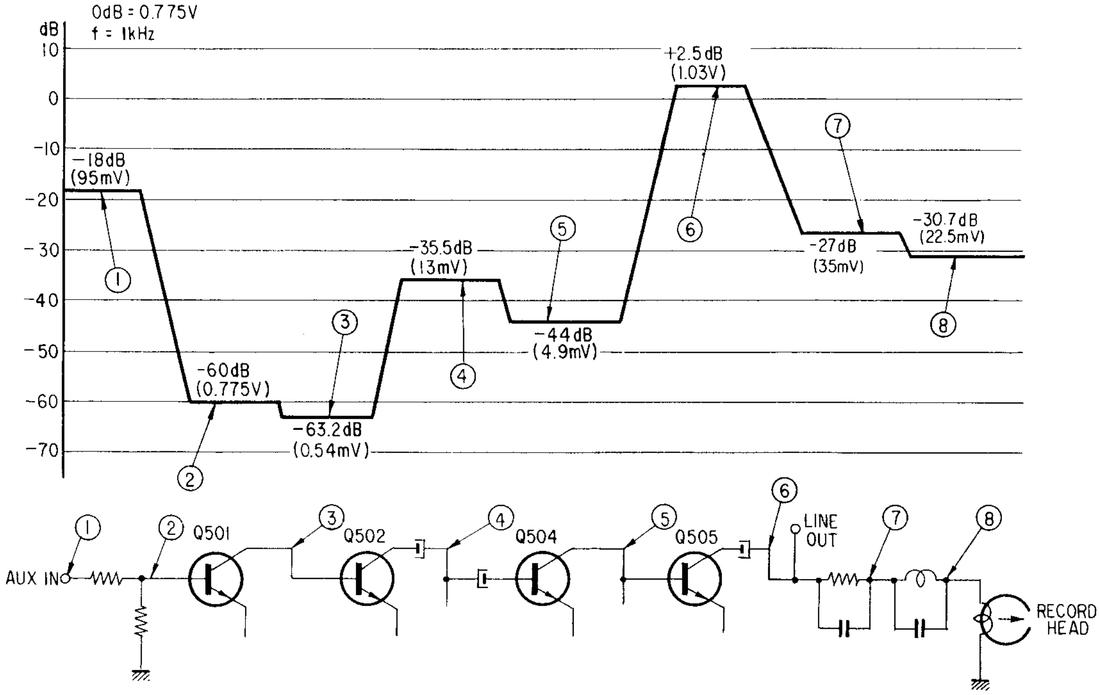
1-1. BLOCK DIAGRAM


ERASE HEAD
S7: ISS SW
1
2
S3-1 MUTING
FWD
LINE OUT
STOP
FF
REW
REC/PB HEAD
REC
PB
S1-1
PB
AUX IN
S1-2
REC
PREAMP
Q501, Q502
FLAT AMP
Q504, 505
S1-4
REC
PB
S5, TAPE SELECT
CrO2
NORMAL
BIAS TRAP
L101, C121
OSC UNIT
BIAS ADJ
MIC
PB
PB EQ
AGC
Q503
REC EQ
REC
S1-3
RV301
AGC BALANCE ADJ
DC AMP
Q551
REC
D101
S2-5
PB
D102
D101, 102 (VOLTAGE DOUBLER)
S1, S2: REC / PB SW
R-CH (Same as L-CH)
B ⊕
RIPPLE FILTER
Q702
From Receiver section, B⊕
M
L202
D103
C306
AC 6V
L102
From Receiver Section (AC 6V)

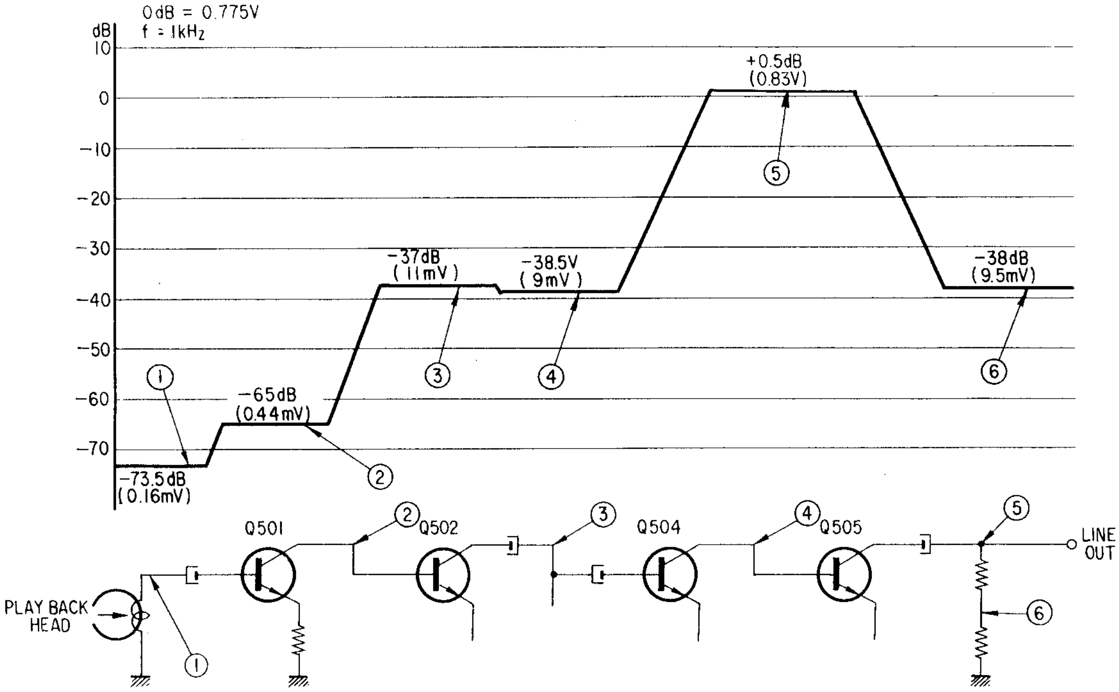
Note: Signal voltages are measured with ac VTVM and expressed in dB referred to 0.775 V, 1 kHz.

1-2. LEVEL DIAGRAM

[Playback Mode]


0dB = 0.775V
f = 1kHz
dB
10
0
-10
-20
-30
-40
-50
-60
-70
-18dB
(95mV)
①
-60dB
(0.775V)
②
③
-63.2dB
(0.54mV)
-35.5dB
(13mV)
④
⑤
-44dB
(4.9mV)
+2.5dB
(1.03V)
⑥
⑦
-27dB
(35mV)
-30.7dB
(22.5mV)
⑧
AUX IN
Q501
Q502
Q504
Q505
LINE
OUT
RECORD
HEAD

[Record Mode]


0dB = 0.775V
f = 1kHz
dB
10
0
-10
-20
-30
-40
-50
-60
-70
①
-73.5dB
(0.16mV)
-65dB
(0.44mV)
②
-37dB
(11mV)
③
-38.5V
(9mV)
④
+0.5dB
(0.83V)
⑤
-38dB
(9.5mV)
⑥
PLAY BACK
HEAD
Q501
Q502
Q504
Q505
LINE
OUT

SECTION 2
DISASSEMBLY AND REPLACEMENT

Note: All screws in this service manual are Phillips type unless otherwise indicated.
(–); slotted head

2-1. CASSETTE DECK REMOVAL

1. Remove the record player cabinet as described in Procedure 2-2 on page 5.
2. Remove the four screws shown in Fig. 2-1.
3. Disconnect the two 6-P connectors at the MIC jack and power supply circuit boards.

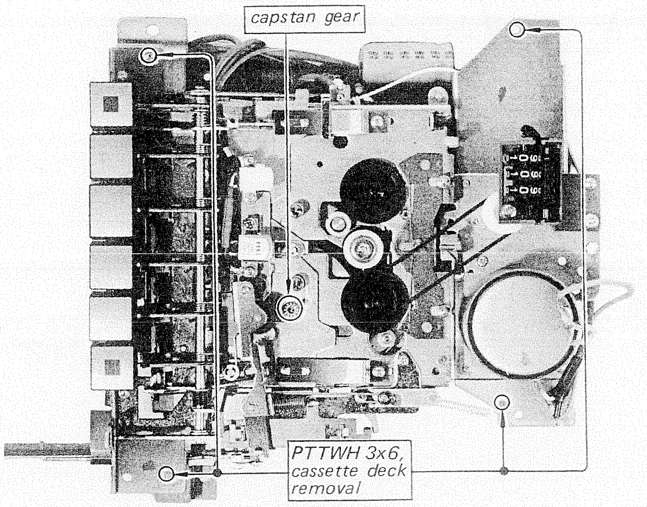

capstan gear
PTTWH 3x6,
cassette deck
removal

Fig. 2-1. Cassette deck removal

2-2. PUSHBUTTON REMOVAL

1. Remove the cassette deck as described in Procedure 2-1.
2. Push the pushbutton ratchet in the arrow direction (A) shown in Fig. 2-2.
3. Pull off the pushbutton in the arrow direction (B) shown in Fig. 2-2.

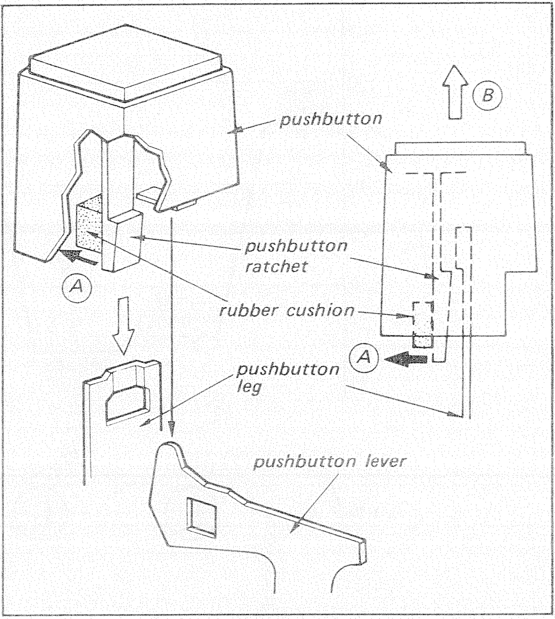

pushbutton
B
pushbutton
ratchet
A
rubber cushion
pushbutton
leg
A
pushbutton lever

Fig. 2-2. Pushbutton removal

2-3. FLYWHEEL REMOVAL

1. Pull off the capstan gear, from the capstan shaft as shown in Fig. 2-1.
2. Remove the two screws securing the flywheel bracket.

Note: If the gear should be removed, replace it with a new one.

2-4. CHASSIS LAYOUT

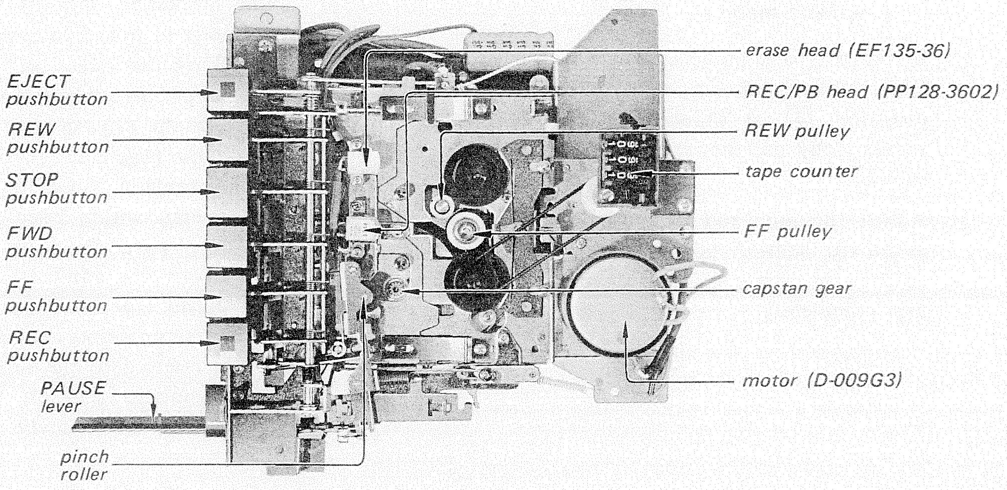

EJECT pushbutton
REW pushbutton
STOP pushbutton
FWD pushbutton
FF pushbutton
REC pushbutton
PAUSE lever
pinch roller
erase head (EF135-36)
REC/PB head (PP128-3602)
REW pulley
tape counter
FF pulley
capstan gear
motor (D-009G3)

Fig. 2-3. Top view

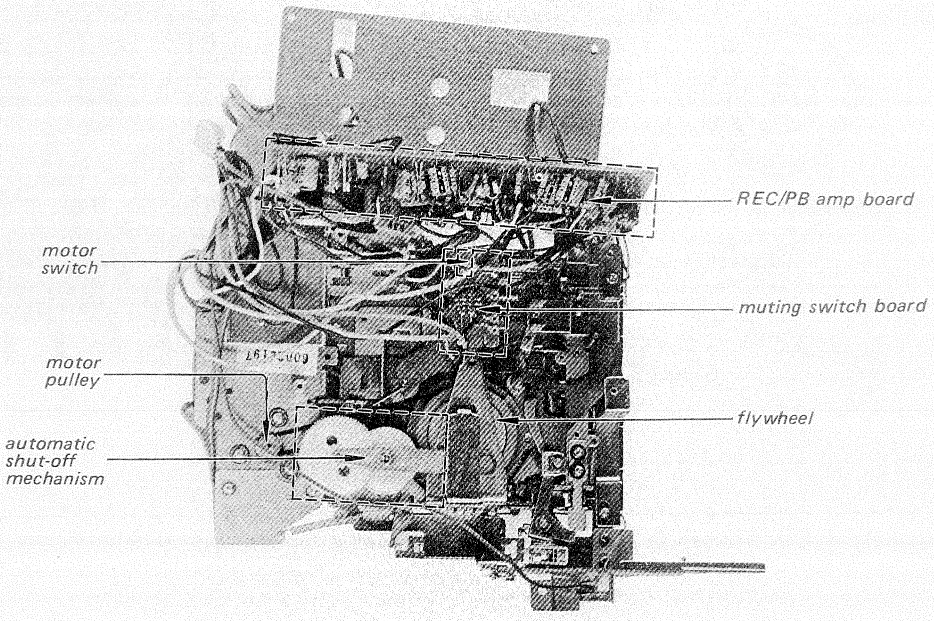

REC/PB amp board
motor switch
muting switch board
motor pulley
flywheel
automatic shut-off mechanism

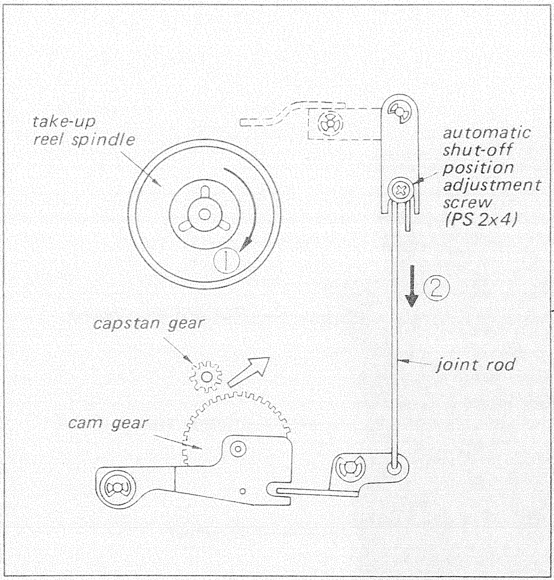
Fig. 2-4. Bottom view

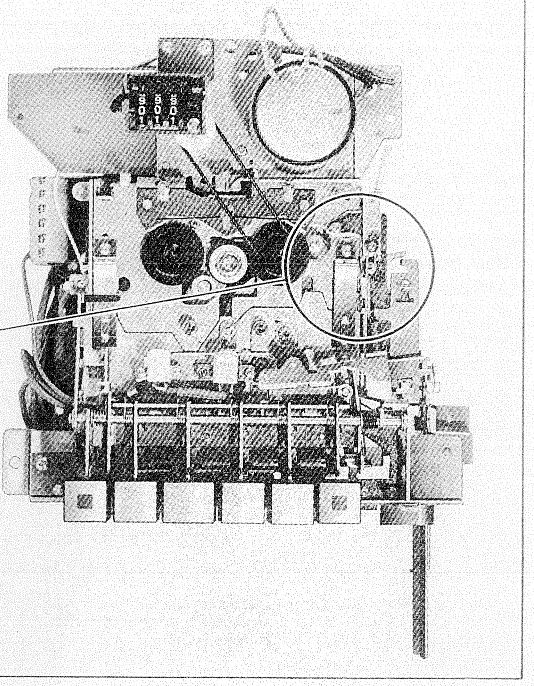
SECTION 3
MECHANICAL ADJUSTMENTS

Automatic Shut-off Position Adjustment

— FWD mode —

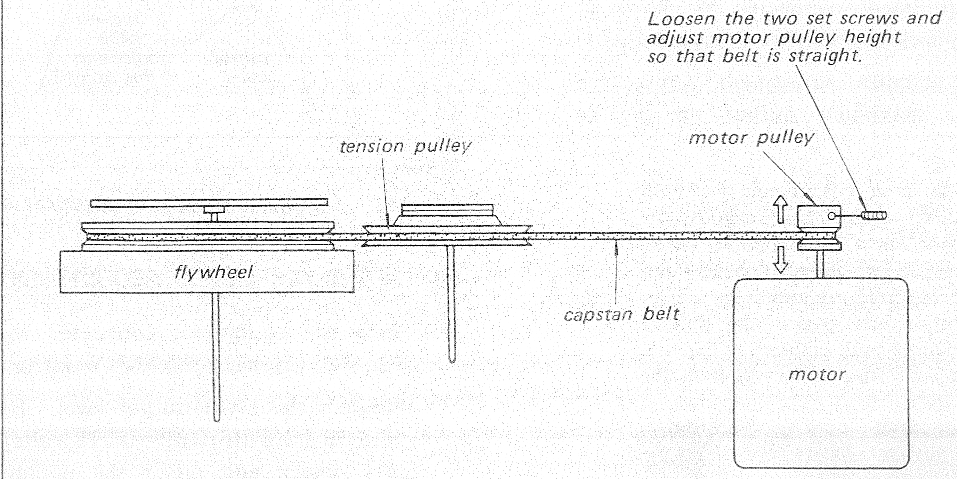
1. In the playback mode and with power switch OFF, turn the take-up reel spindle in the arrow direction ① as shown until the joint rod moves fully in the arrow direction ② as shown.
2. Adjust the joint rod length by loosening the automatic shut-off position adjustment screw so that the cam gear engages with the capstan gear completely.
3. After completing the adjustment, check whether the automatic shut-off mechanism operates correctly or not as follows:
   1) When the unit is set to playback or record mode, the clearance between the cam gear and the capstan gear should be more than 2 mm ($^{5}/_{64}$").
   2) Automatic Shut-off Mechanism should operate within 5 sec. at the tape end.
   3) A physical shock to the unit should not trigger the automatic shut-off mechanism during tape running.
   4) When an empty reel side of a cassette tape is inserted to the supply reel spindle, the automatic shut-off mechanism should operate immediately.





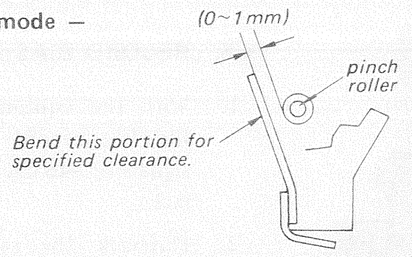
Motor Pulley Height Adjustment

– STOP mode –


Loosen the two set screws and adjust motor pulley height so that belt is straight.
tension pulley
motor pulley
flywheel
capstan belt
motor

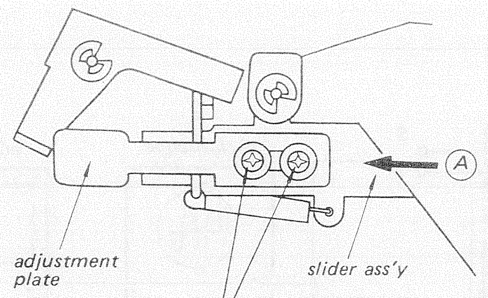
Fast Forward Spring Adjustment

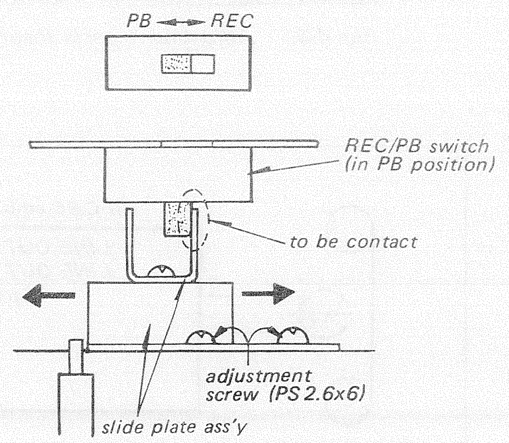
– STOP mode –


(0~1 mm)
pinch roller
Bend this portion for specified clearance.

REC/PB Switch Lever Position Adjustment

– STOP mode –


Ⓐ
adjustment plate
slider ass'y

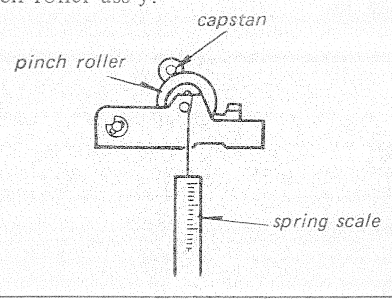

PB ◄─► REC
REC/PB switch (in PB position)
to be contact
adjustment screw (PS 2.6x6)
slide plate ass'y

1. Loosen the two screws (PS 2.6x5) and slide the adjustment plate fully in the arrow direction Ⓐ, and fasten them.
2. Set the REC/PB switch to "PB".
3. Loosen the two adjustment screws.
4. Move the REC/PB switch lever ass'y in the arrow direction so that the slide plate ass'y contacts with the REC/PB switch.

Pinch Roller Pressure Measurement

– Playback mode –

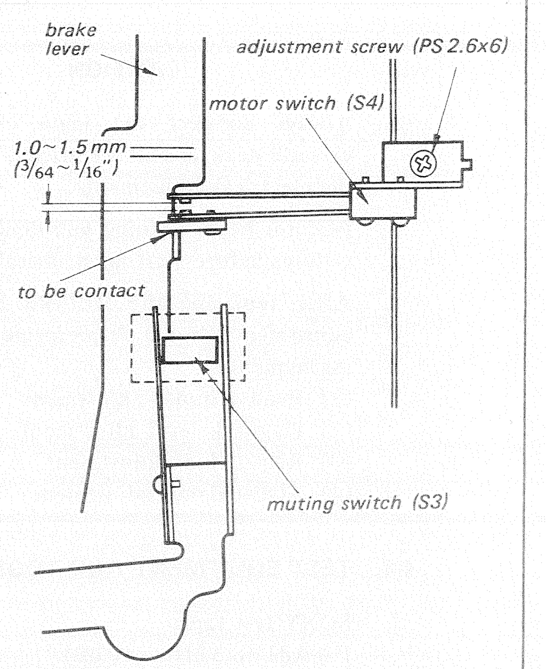
1. In FWD mode, hook a spring scale to the pinch roller.
2. Take a reading only when the pinch roller is pulled backward by the spring scale, and then start to return towards the capstan, because the force required to overcome the static friction will produce a false and excessively high initial readings.
3. The readings should be 280 to 360 g (0.6 to 0.79 oz). If necessary, check and replace the pinch roller ass'y.

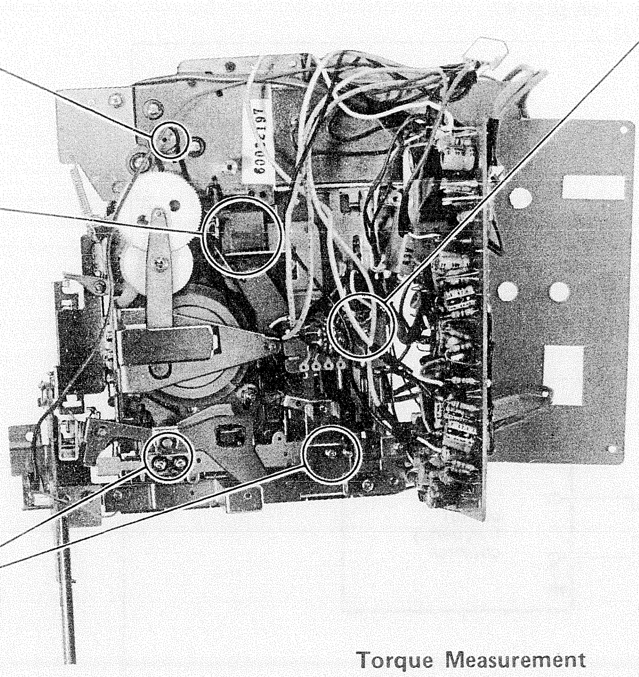

capstan
pinch roller
spring scale

Motor Switch Position Adjustment

– STOP mode –

1. Loosen the adjustment screw.
2. Adjust the position of the motor switch (S4) so that the clearance between the flat springs of the motor switch is 1 ~ 1.5 mm (3/64 ~ 1/16"), while the brake lever contacts with one side of the motor switch.
3. Slowly pressing the forward button, check to see that the muting switch (S3) is switched over after the motor switch is closed.
4. Apply a drop of locking compound to the screw.


brake lever
adjustment screw (PS 2.6x6)
motor switch (S4)
1.0~1.5 mm (3/64~1/16")
to be contact
muting switch (S3)



Torque Measurement

Mode	Torque
FWD	40 ~ 60 g·cm (0.56 ~ 0.83 oz·inch)
FF, REW	70 ~ 150 g·cm (0.84 ~ 2.1 oz·inch)

Checks After the Adjustments

- Forward, fast forward, rewind, and RECORD buttons can be locked. Stop and EJECT buttons cannot be locked.
- PAUSE button can be locked by the first press and can be released by the second press.

Mode	Function Buttons	Remarks
playback	fast forward rewind PAUSE stop	possible to press
	RECORD EJECT	impossible to press
fast forward	forward rewind stop EJECT	possible to press
	RECORD	impossible to press
rewind	forward fast forward stop EJECT	possible to press
	RECORD	impossible to press
record	fast forward rewind stop	possible to press
	EJECT	impossible to press

SECTION 4
ELECTRICAL ADJUSTMENTS

CAUTION

1. Always connect the main chassis and the cassette deck chassis electrically when performing electrical adjustments.
2. Perform head cleaning and demagnetizing procedures before starting electrical adjustments.
3. After replacing the REC/PB head, electrical adjustments should be performed in the following sequence.
   (1) Head azimuth adjustment
   (2) Playback level adjustment
   (3) Record bias adjustment
   (4) AGC balance adjustment

4-1. TEST EQUIPMENT AND TOOLS REQUIRED

1. SONY test tapes
   P-4-A81 (6.3 kHz, -10 dB)
   .... Head azimuth adj.
   P-4-L81 (333 Hz, 0 dB)
   .... Playback level adj.
   SPC-4 (1 kHz) .... Tape speed adj.
2. Audio signal generator
3. Attenuator, 600 ohms unbalanced
4. Ac VTVM or Level Meter
5. 600 Ω and 100 kΩ resistor, 1/4 watts
6. Connection cord
7. Screwdriver, 3 mm (1/8") blade
8. Digital counter

4-2. TAPE SPEED ADJUSTMENT

1. With the equipment connected as shown in Fig. 4-1, playback the beginning and the end portions of the SONY test tape SPC-4.
2. Measure the frequency through the CNJ10 on the REC/PB amp board by using a digital frequency counter. The reading should be as follows:

   Frequency: Within 980 to 1,025 Hz
   Difference between the
   beginning and the end: Within 10 Hz
   If necessary, replace the motor pulley referring to the following table.

Motor Pulley (See Fig. 4-2)

Part No.	Identification	Tape Speed
3-489-117-01	no groove	slower (-2 %)
3-489-117-31	three grooves	slower (-1 %)
3-489-117-11	one groove	standard
3-489-117-21	two grooves	faster (+2 %)

Note: After replacing the motor pulley, adjust the Motor Pulley Height as described on page 47.

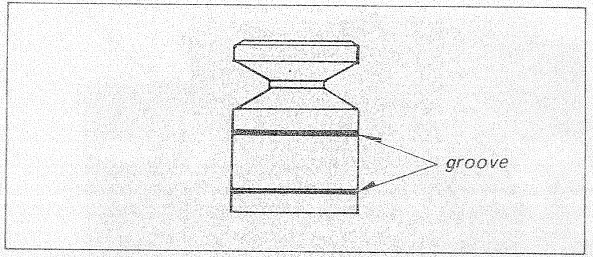


Fig. 4-2. Motor pulley

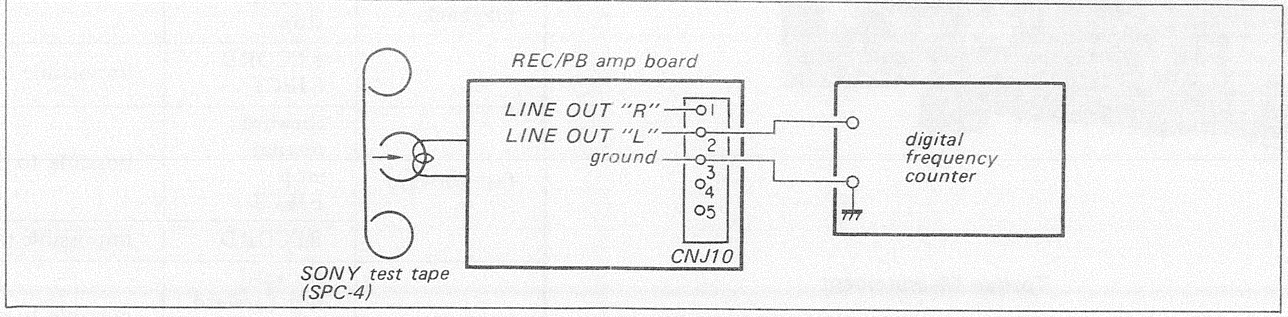


Fig. 4-1. Tape speed adjustment test setup

4-3. HEAD AZIMUTH ADJUSTMENT

1. With the equipment connected as shown in Fig. 4-3, playback the SONY test tape P-4-A81.
2. Adjust the azimuth adjustment screw (see Fig. 4-4) for maximum output on the ac VTVM.

Note: If the maximum output points of both channels do not coincide, readjust the adjustment screw for minimum difference between left- and right-channel output. If the head azimuth is far out of alignment, minor peaks may observe before highest peak as shown in Fig. 4-5. The proper setting is the higher of the two peaks.

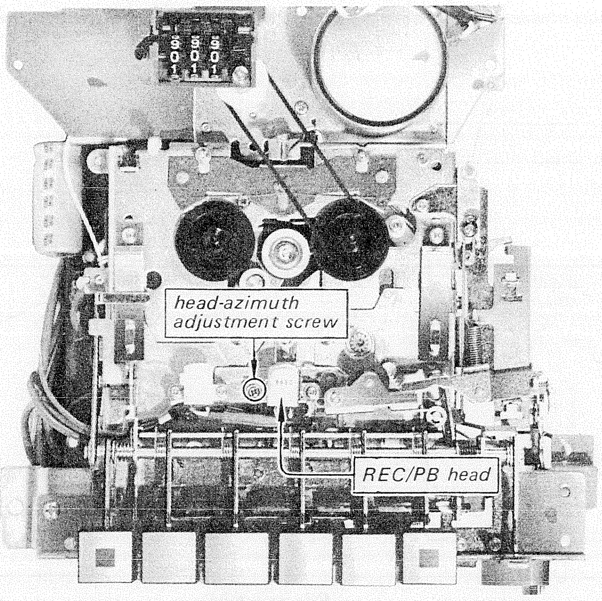


Fig. 4-4. Adjustment parts location

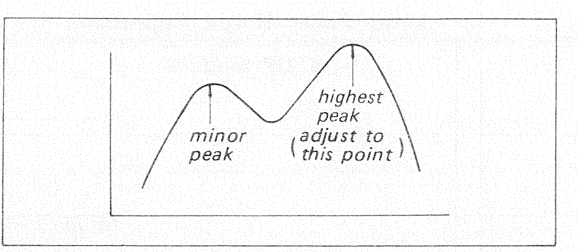


Fig. 4-5. Output response of azimuth adjustment

4-4. PLAYBACK LEVEL ADJUSTMENT

1. With the equipment connected as shown in Fig. 4-3, playback the SONY test tape P-4-L81.
2. Measure the L-CH output level. It should be +1.5 dB ± 1.5 dB (0 dB = 0.775 volts). If necessary, check and repair the preamplifier and flat amplifier.
3. Check the R-CH output level, turn the playback level adj. RV202 (see Fig. 4-6) to obtain the same output level as in the L-CH.

4-5. RECORD BIAS ADJUSTMENT

1. With the equipment connected as shown in Fig. 4-8, record the 700 Hz and the 7 kHz signals of -46 dB (3.9 mV) through the AUX IN jack.
2. Playback the recorded signals and measure the output levels of the two signals.
   The 7 kHz signal should be within 0.5 dB referred to the 700 Hz signal.

Note: The difference between both channels should be also within 3 dB.

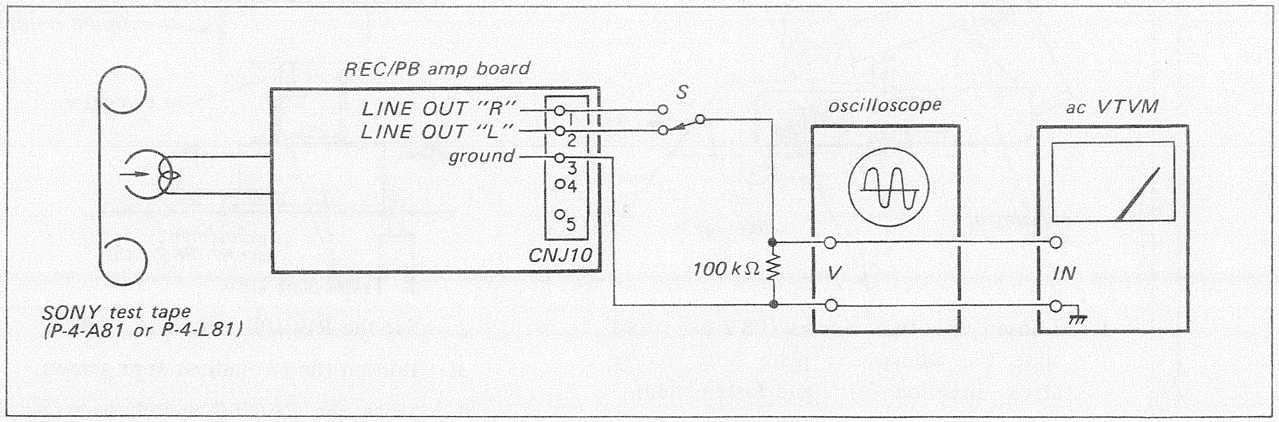


Fig. 4-3. Head-azimuth and playback-level adjustment setup

If necessary, change the value of bias capacitor by soldering the patterns on the rec/pb amp circuit board as follows (See Fig. 4-7):

(a) If the 7 kHz level is higher than 700 Hz, increase the capacitance value.

(b) If the 7 kHz level is lower than 700 Hz, decrease the capacitance value.

L-CH: C122 ~ C124
R-CH: C222 ~ C224
See Fig. 4-7.

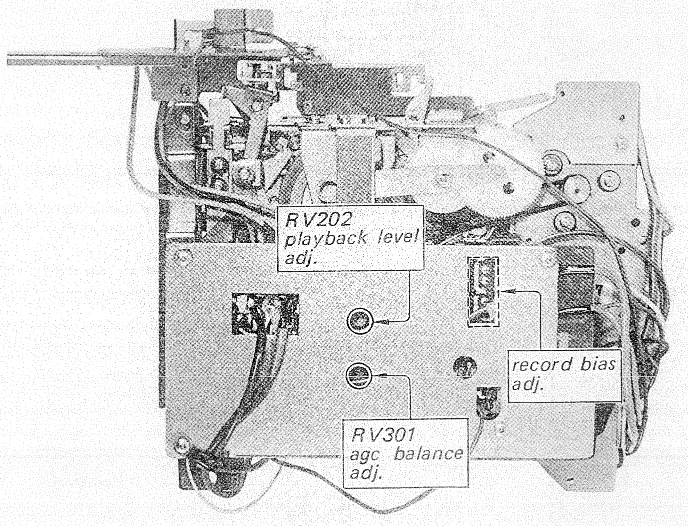

RV202
playback level
adj.
record bias
adj.
RV301
agc balance
adj.

Fig. 4-6. Adjustment parts location

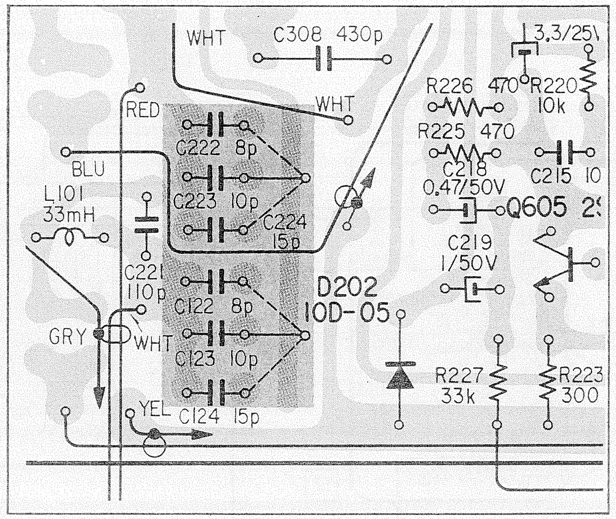

WHT
C308 430p
3.3/25V
R226 470
R220 10k
RED
WHT
R225 470
C222 8p
BLU
L101
33mH
C223 10p
C224 15p
C218 0.47/50V
C215 10
Q605 2S
C219 1/50V
C221 110p
C122 8p
D202
10D-05
GRY
WHT
C123 10p
R227 33k
R223 300
YEL
C124 15p

Fig. 4-7. Record bias adjustment

4-6. AGC BALANCE ADJUSTMENT

Note: This adjustment should be performed after completing playback level adjustment.

1. With the equipment connected as shown in Fig. 4-8, record a 1 kHz signal of −27 dB (35 mV) and then play it back.
2. Confirm that both channel outputs are within 4 ± 1 dB and the output difference should be 0.5 dB or less. If necessary, turn the agc balance adj. RV301 (see Fig. 4-6) to obtain the same outputs.

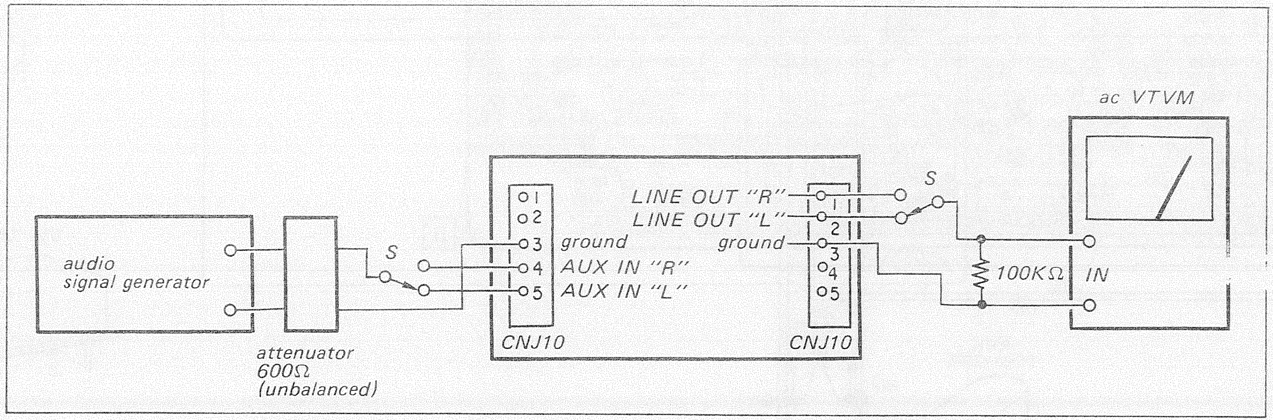

audio
signal generator
attenuator
600Ω
(unbalanced)
S
1
2
3 ground
4 AUX IN "R"
5 AUX IN "L"
CNJ10
LINE OUT "R"
LINE OUT "L"
ground
1
2
3
4
5
CNJ10
S
100KΩ
ac VTVM
IN

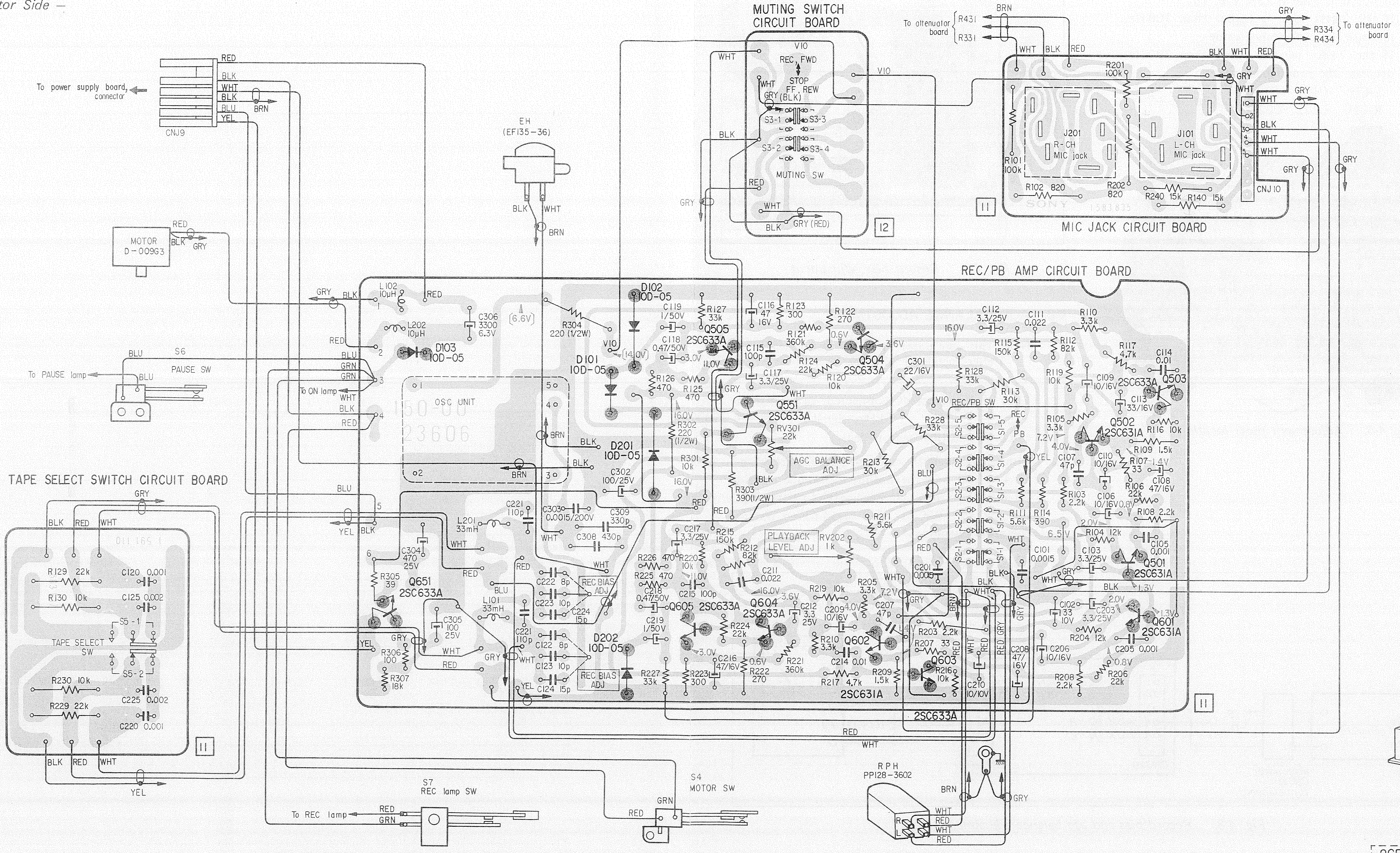
Fig. 4-8. Record bias and agc balance adjustment setup

MEMO

SECTION 5
DIAGRAMS

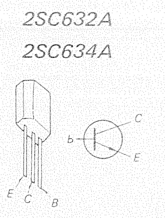
5-1. MOUNTING DIAGRAM – REC/PB Amp, MUTING Switch, TAPE SELECT Switch and MIC Jack Board –

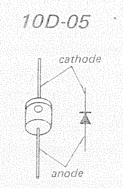
– Conductor Side –

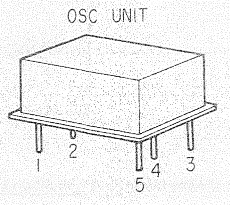

MUTING SWITCH CIRCUIT BOARD
MIC JACK CIRCUIT BOARD
REC/PB AMP CIRCUIT BOARD
TAPE SELECT SWITCH CIRCUIT BOARD
To power supply board, connector
CNJ9
RED
BLK
WHT
BLU
YEL
BRN
GRY
GRN
MOTOR D-009G3
To PAUSE lamp
PAUSE SW
S6
EH (EF135-36)
To attenuator board
R431
R331
R334
R434
V10
REC, FWD
STOP
FF, REW
GRY (BLK)
S3-1
S3-2
S3-3
S3-4
MUTING SW
GRY (RED)
12
R201 100k
R101 100k
J201 R-CH MIC jack
J101 L-CH MIC jack
R102 820
R202 820
R240 15k
R140 15k
CNJ10
11
L102 10μH
L202 10μH
C306 3300 6.3V
R304 220 (1/2W)
(6.6V)
D103 10D-05
D102 10D-05
D101 10D-05
D201 10D-05
D202 10D-05
To ON lamp
OSC UNIT
C119 1/50V
C118 0.47/50V
R127 33k
Q505 2SC633A
C116 47 16V
R123 300
R122 270
R121 360k
C115 100p
C117 3.3/25V
R124 22k
R120 10k
Q504 2SC633A
Q551 2SC633A
RV301 22k
AGC BALANCE ADJ
R126 470
R125 470
R302 220 (1/2W)
R301 10k
R303 390 (1/2W)
C302 100/25V
C301 22/16V
C112 3.3/25V
C111 0.022
R110 3.3k
R115 150k
R112 82k
R117 4.7k
C114 0.01
R128 33k
R113 30k
R119 10k
C109 10/16V
Q503 2SC633A
C113 33/16V
REC/PB SW
R228 33k
R213 30k
R105 3.3k
Q502 2SC631A
R116 10k
C107 47p
C110 10/16V
R109 1.5k
R107 1.4V
C108 47/16V
R106 22k
R103 2.2k
C106 10/16V
R108 2.2k
S2-1 S2-2 S2-3 S2-4 S2-5
S1-1 S1-2 S1-3 S1-4 S1-5
REC
PB
R111 5.6k
R114 390
R211 5.6k
R104 12k
C103 3.3/25V
C105 0.001
C101 0.0015
Q501 2SC631A
C201 0.0015
C221 110p
L201 33mH
C303 0.0015/200V
C309 330p
C308 430p
C304 470 25V
R305 39
Q651 2SC633A
C217 3.3/25V
R215 150k
R212 82k
PLAYBACK LEVEL ADJ
RV202 1k
R226 470
R225 470
R220 10k
C211 0.022
C218 0.47/50V
C215 100p
C222 8p
C223 10p
C224 15p
REC BIAS ADJ
L101 33mH
C305 100 25V
C219 1/50V
Q605 2SC633A
Q604 2SC633A
C212 3.3 25V
R219 10k
R205 3.3k
C209 10/16V
C207 47p
C202 33 10V
C203 3.3/25V
Q601 2SC631A
R224 22k
R210 3.3k
Q602
C214 0.01
R203 2.2k
R207 33
Q603
R216 10k
C208 47/16V
C206 10/16V
R204 12k
C205 0.001
C221 110p
C122 8p
C123 10p
C124 15p
R306 100
R307 18k
R227 33k
R223 300
C216 47/16V
R222 270
R221 360k
R217 4.7k
R209 1.5k
C210 10/10V
R208 2.2k
R206 22k
2SC631A
2SC633A
R129 22k
C120 0.001
R130 10k
C125 0.002
S5-1
TAPE SELECT SW
S5-2
R230 10k
C225 0.002
R229 22k
C220 0.001
S7 REC lamp SW
To REC lamp
S4 MOTOR SW
RPH PP128-3602

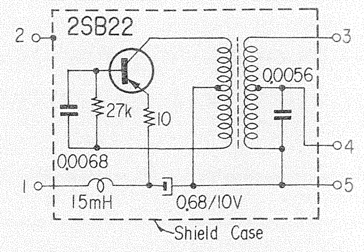
Semiconductors Location

D103 D102 Q505 Q504 Q502 Q503
D101 D201 Q551
Q651 Q605 Q604 Q602 Q603 Q501
D202 Q601

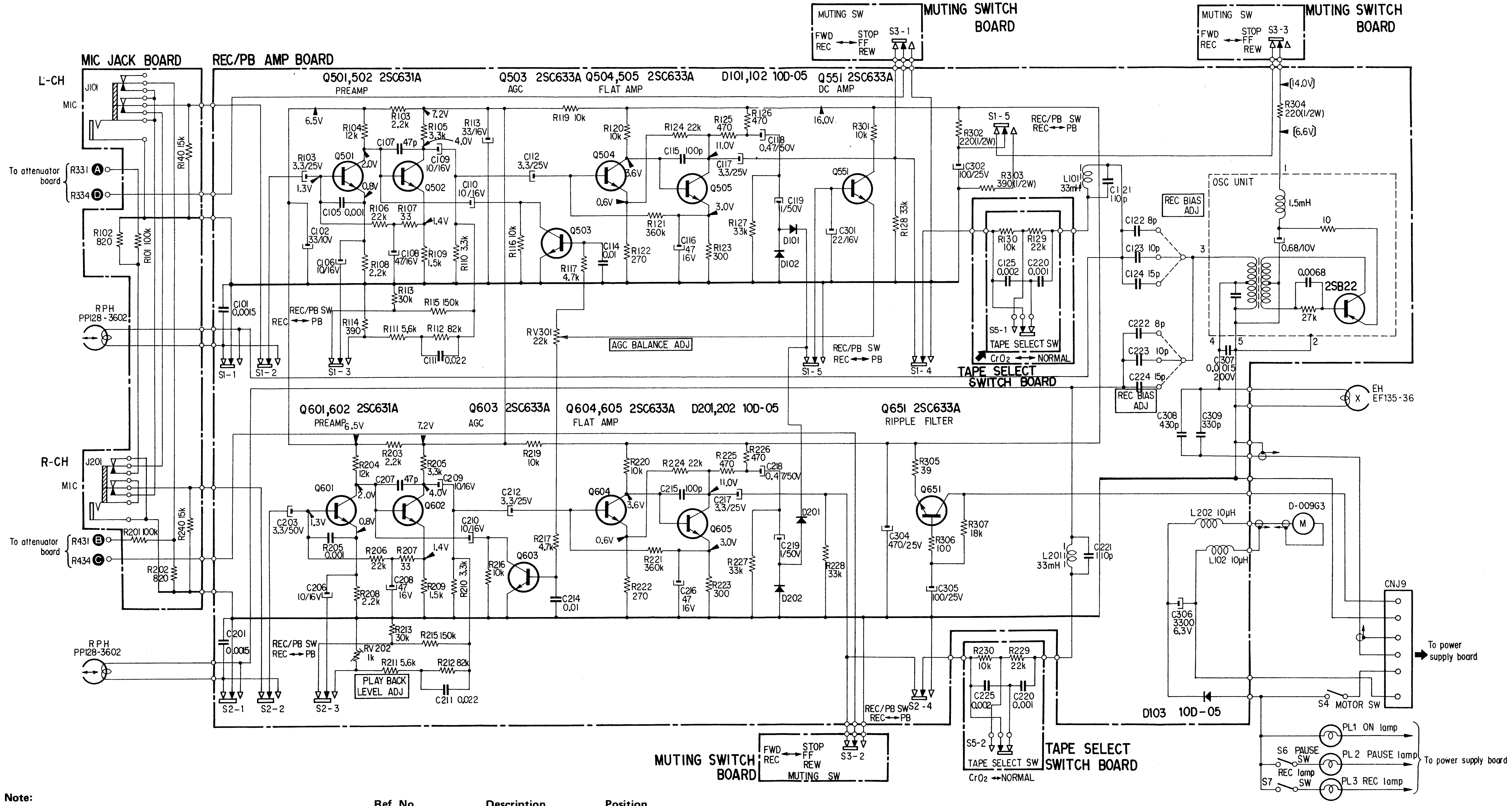

2SC632A
2SC634A
b
C
E
E C B


10D-05
cathode
anode


OSC UNIT
1 2 5 4 3


2SB22
2
3
4
1
5
27k
10
0.0056
0.0068
15mH
0.68/10V
Shield Case

5-2. SCHEMATIC DIAGRAM – REC/PB Amp, MUTING Switch, TAPE SELECT Switch and MIC Jack Section –


MIC JACK BOARD
REC/PB AMP BOARD
MUTING SWITCH BOARD
MUTING SW
FWD ↔ STOP FF REW
REC
S3-1
S3-2
S3-3
L-CH
R-CH
J101
J201
MIC
To attenuator board
R331 Ⓐ
R334 Ⓓ
R431 Ⓑ
R434 Ⓒ
R140 15k
R240 15k
R102 820
R101 100k
R201 100k
R202 820
RPH PP128-3602
C101 0.0015
C201 0.0015
Q501,502 2SC631A PREAMP
Q503 2SC633A AGC
Q504,505 2SC633A FLAT AMP
D101,102 10D-05
Q551 2SC633A DC AMP
Q601,602 2SC631A PREAMP
Q603 2SC633A AGC
Q604,605 2SC633A FLAT AMP
D201,202 10D-05
Q651 2SC633A RIPPLE FILTER
6.5V
7.2V
R104 12k
R103 2.2k
R105 3.3k
R113 33/16V
4.0V
C107 47p
C109 10/16V
2.0V
0.8V
1.3V
C105 0.001
R106 22k
R107 33
1.4V
C102 33/10V
C106 10/16V
R108 2.2k
C108 47/16V
R109 1.5k
R110 3.3k
C110 10/16V
R113 30k
R115 150k
R114 390
R111 5.6k
R112 82k
C111 0.022
REC/PB SW REC ↔ PB
S1-1
S1-2
S1-3
S1-4
S1-5
S2-1
S2-2
S2-3
S2-4
R119 10k
C112 3.3/25V
R116 10k
R117 4.7k
C114 0.01
RV301 22k
AGC BALANCE ADJ
R120 10k
R124 22k
R125 470
R126 470
C118 0.47/50V
C115 100p
C117 3.3/25V
11.0V
3.6V
0.6V
3.0V
R121 360k
C116 47 16V
R122 270
R123 300
R127 33k
C119 1/50V
D101
D102
16.0V
R301 10k
C301 22/16V
R128 33k
R302 220(1/2W)
C302 100/25V
R303 390(1/2W)
L101 33mH
C121 110p
R130 10k
R129 22k
C125 0.002
C220 0.001
S5-1
TAPE SELECT SW
CrO2 ↔ NORMAL
TAPE SELECT SWITCH BOARD
REC BIAS ADJ
C122 8p
C123 10p
C124 15p
C222 8p
C223 10p
C224 15p
C307 0.01 015 200V
C308 430p
C309 330p
OSC UNIT
1.5mH
10
0.68/10V
0.0068
2SB22
27k
[14.0V]
R304 220(1/2W)
[6.6V]
EH EF135-36
R203 2.2k
R204 12k
R205 3.3k
C207 47p
C209 10/16V
C203 3.3/50V
R205 0.001
R206 22k
R207 33
C206 10/16V
R208 2.2k
C208 47 16V
R209 1.5k
R210 3.3k
C210 10/16V
R219 10k
C212 3.3/25V
R217 4.7k
R216 10k
C214 0.01
R213 30k
R215 150k
RV202 1k
R211 5.6k
R212 82k
PLAY BACK LEVEL ADJ
C211 0.022
R220 10k
R224 22k
R225 470
R226 470
C218 0.47/50V
C215 100p
C217 3.3/25V
R221 360k
C216 47 16V
R222 270
R223 300
R227 33k
C219 1/50V
D201
D202
R228 33k
C304 470/25V
R305 39
R306 100
R307 18k
C305 100/25V
L201 33mH
C221 110p
L202 10μH
L102 10μH
D-009G3
M
C306 3300 6.3V
CNJ9
To power supply board
D103 10D-05
S4 MOTOR SW
R230 10k
R229 22k
C225 0.002
C220 0.001
S5-2
PL1 ON lamp
S6 PAUSE SW
PL2 PAUSE lamp
REC lamp SW
S7
PL3 REC lamp
To power supply board

Note:

All resistance values are in ohms. k = 1,000, M = 1,000 k.

All capacitance values are in μF except as indicated with p, which means $\mu\mu$F.

All voltages are dc measured in playback mode with a VOM which has an input impedance of 20 k ohms/volt. No signal in.

Voltages in [ ] are measured in record mode.

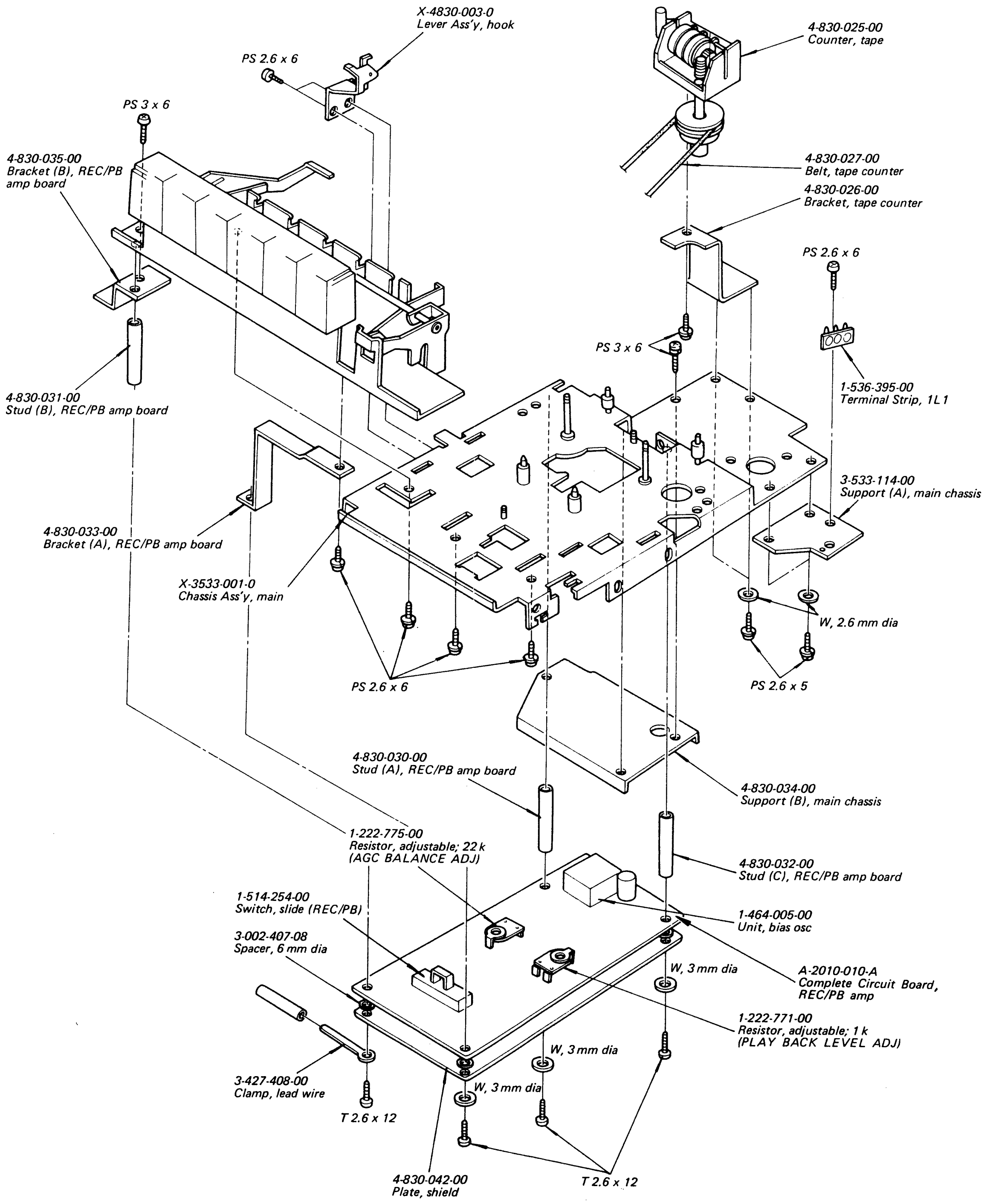
Voltage variations may be noted because of normal production tolerances.

Ref. No.	Description	Position
S1,2	REC/PB SW (REC – PB)	REC
S3	MUTING SW (FWD–STOP, FF, REW)	FWD
S4	MOTOR SW	ON
S5	TAPE SELECT SW (NORMAL – CrO$_2$)	NORMAL
S6	PAUSE SW	OFF

SECTION 6
EXPLODED VIEWS

(1)

Note: All screws in this service manual are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head.


X-4830-003-0
Lever Ass'y, hook
PS 2.6 x 6
PS 3 x 6
4-830-035-00
Bracket (B), REC/PB amp board
4-830-025-00
Counter, tape
4-830-027-00
Belt, tape counter
4-830-026-00
Bracket, tape counter
PS 2.6 x 6
PS 3 x 6
1-536-395-00
Terminal Strip, 1L1
4-830-031-00
Stud (B), REC/PB amp board
3-533-114-00
Support (A), main chassis
4-830-033-00
Bracket (A), REC/PB amp board
X-3533-001-0
Chassis Ass'y, main
W, 2.6 mm dia
PS 2.6 x 6
PS 2.6 x 5
4-830-030-00
Stud (A), REC/PB amp board
4-830-034-00
Support (B), main chassis
1-222-775-00
Resistor, adjustable; 22 k
(AGC BALANCE ADJ)
4-830-032-00
Stud (C), REC/PB amp board
1-514-254-00
Switch, slide (REC/PB)
1-464-005-00
Unit, bias osc
3-002-407-08
Spacer, 6 mm dia
W, 3 mm dia
A-2010-010-A
Complete Circuit Board, REC/PB amp
1-222-771-00
Resistor, adjustable; 1 k
(PLAY BACK LEVEL ADJ)
W, 3 mm dia
W, 3 mm dia
3-427-408-00
Clamp, lead wire
T 2.6 x 12
4-830-042-00
Plate, shield
T 2.6 x 12

– Hardware Nomenclature –

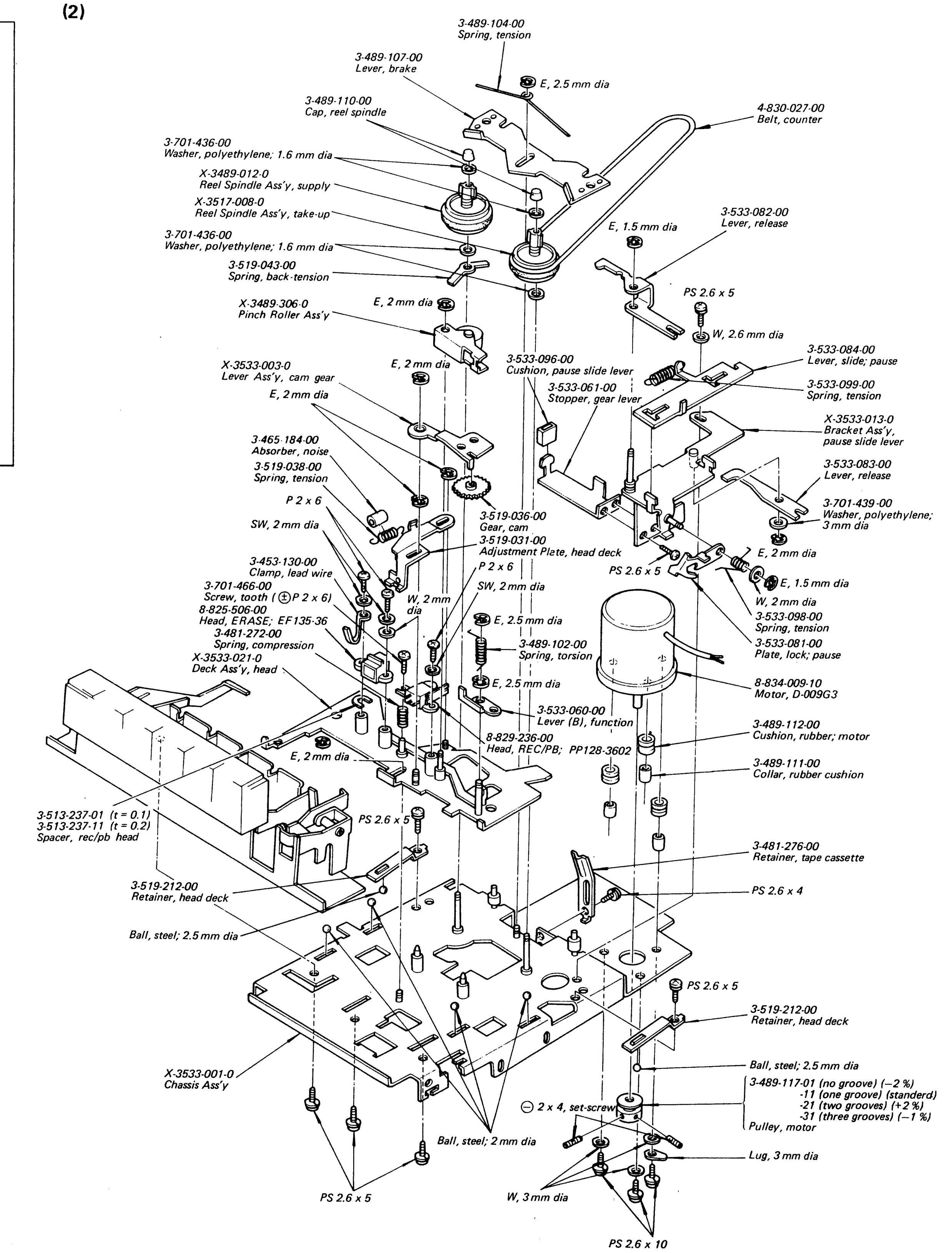
P –	Pan Head Screw
PS –	Pan Head Screw with Spring Washer
K –	Flat Countersunk Head Screw
B –	Binding Head Screw
RK –	Oval Countersunk Head Screw
T –	Truss Head Screw
R –	Round Head Screw
F –	Flat Fillister Head Screw
SC –	Set Screw
E –	Retaining Ring (E Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

– Example –

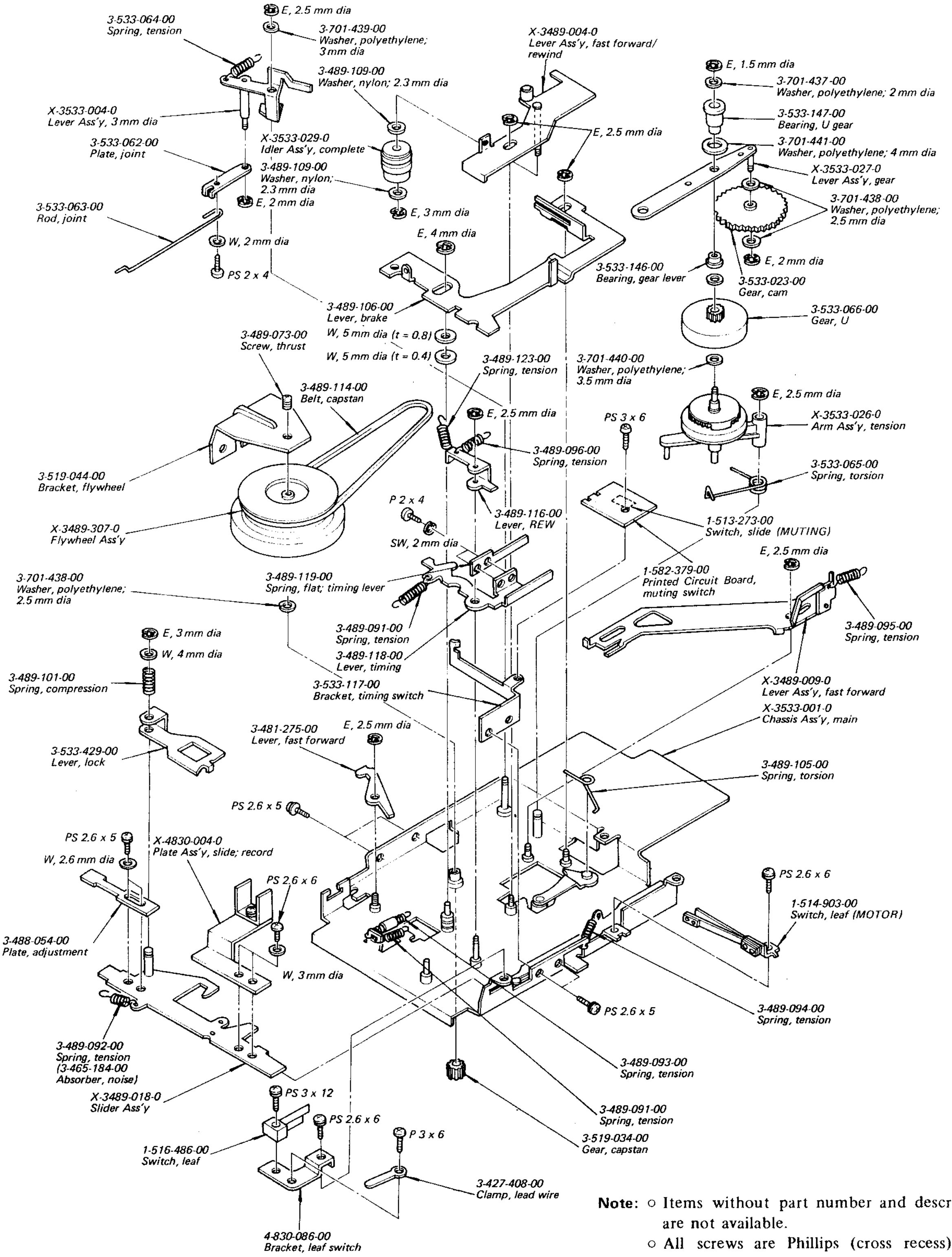
Type of Slot
⊕ P 3x10
Length in mm (L)
Diameter in mm (D)
Type of Head

(2)


3-489-104-00
Spring, tension
3-489-107-00
Lever, brake
E, 2.5 mm dia
3-489-110-00
Cap, reel spindle
4-830-027-00
Belt, counter
3-701-436-00
Washer, polyethylene; 1.6 mm dia
X-3489-012-0
Reel Spindle Ass'y, supply
X-3517-008-0
Reel Spindle Ass'y, take-up
3-533-082-00
Lever, release
E, 1.5 mm dia
3-701-436-00
Washer, polyethylene; 1.6 mm dia
3-519-043-00
Spring, back-tension
PS 2.6 x 5
X-3489-306-0
Pinch Roller Ass'y
E, 2 mm dia
W, 2.6 mm dia
3-533-084-00
Lever, slide; pause
X-3533-003-0
Lever Ass'y, cam gear
E, 2 mm dia
3-533-096-00
Cushion, pause slide lever
3-533-061-00
Stopper, gear lever
3-533-099-00
Spring, tension
E, 2 mm dia
X-3533-013-0
Bracket Ass'y, pause slide lever
3-465-184-00
Absorber, noise
3-519-038-00
Spring, tension
3-533-083-00
Lever, release
P 2 x 6
3-519-036-00
Gear, cam
3-701-439-00
Washer, polyethylene; 3 mm dia
SW, 2 mm dia
3-519-031-00
Adjustment Plate, head deck
E, 2 mm dia
P 2 x 6
PS 2.6 x 5
E, 1.5 mm dia
3-453-130-00
Clamp, lead wire
SW, 2 mm dia
3-701-466-00
Screw, tooth (⊕P 2 x 6)
W, 2 mm dia
W, 2 mm dia
8-825-506-00
Head, ERASE; EF135-36
E, 2.5 mm dia
3-533-098-00
Spring, tension
3-481-272-00
Spring, compression
3-489-102-00
Spring, torsion
3-533-081-00
Plate, lock; pause
X-3533-021-0
Deck Ass'y, head
E, 2.5 mm dia
8-834-009-10
Motor, D-009G3
3-533-060-00
Lever (B), function
8-829-236-00
Head, REC/PB; PP128-3602
3-489-112-00
Cushion, rubber; motor
E, 2 mm dia
3-489-111-00
Collar, rubber cushion
3-513-237-01 (t = 0.1)
3-513-237-11 (t = 0.2)
Spacer, rec/pb head
PS 2.6 x 5
3-481-276-00
Retainer, tape cassette
3-519-212-00
Retainer, head deck
PS 2.6 x 4
Ball, steel; 2.5 mm dia
PS 2.6 x 5
3-519-212-00
Retainer, head deck
Ball, steel; 2.5 mm dia
X-3533-001-0
Chassis Ass'y
3-489-117-01 (no groove) (–2 %)
-11 (one groove) (standerd)
-21 (two grooves) (+2 %)
-31 (three grooves) (–1 %)
Pulley, motor
⊖ 2 x 4, set-screw
Ball, steel; 2 mm dia
Lug, 3 mm dia
PS 2.6 x 5
W, 3 mm dia
PS 2.6 x 10

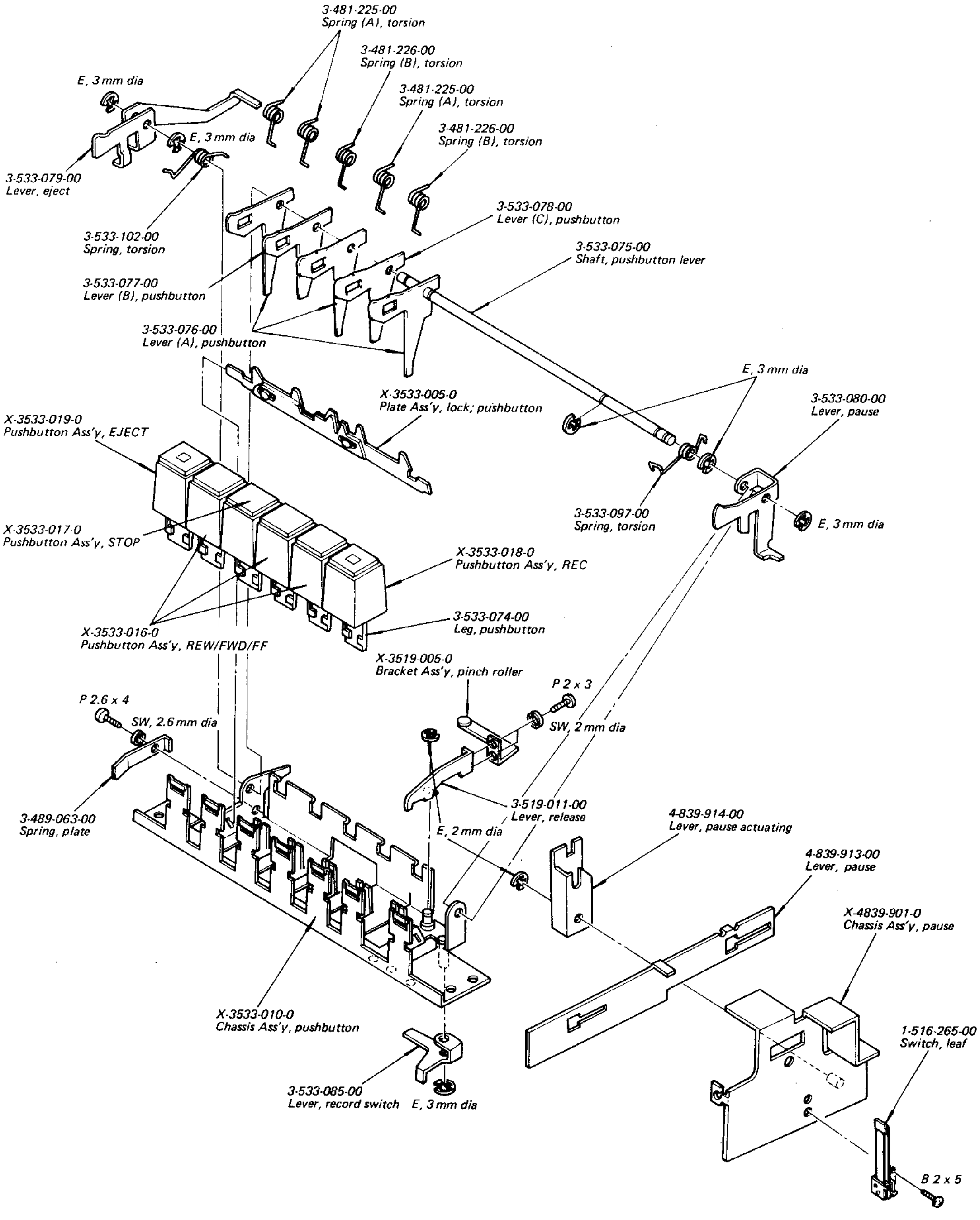
Note: ○ Items without part number and description are not available.
○ All screws are Phillips (cross recess) type unless otherwise noted.
(–) = slotted head

(3)


E, 2.5 mm dia
3-533-064-00
Spring, tension
3-701-439-00
Washer, polyethylene; 3 mm dia
3-489-109-00
Washer, nylon; 2.3 mm dia
X-3489-004-0
Lever Ass'y, fast forward/rewind
E, 1.5 mm dia
3-701-437-00
Washer, polyethylene; 2 mm dia
3-533-147-00
Bearing, U gear
3-701-441-00
Washer, polyethylene; 4 mm dia
X-3533-004-0
Lever Ass'y, 3 mm dia
3-533-062-00
Plate, joint
X-3533-029-0
Idler Ass'y, complete
E, 2.5 mm dia
X-3533-027-0
Lever Ass'y, gear
3-489-109-00
Washer, nylon; 2.3 mm dia
E, 2 mm dia
3-701-438-00
Washer, polyethylene; 2.5 mm dia
3-533-063-00
Rod, joint
E, 3 mm dia
E, 4 mm dia
W, 2 mm dia
PS 2 x 4
E, 2 mm dia
3-533-146-00
Bearing, gear lever
3-533-023-00
Gear, cam
3-489-106-00
Lever, brake
3-533-066-00
Gear, U
3-489-073-00
Screw, thrust
W, 5 mm dia (t = 0.8)
W, 5 mm dia (t = 0.4)
3-489-123-00
Spring, tension
3-701-440-00
Washer, polyethylene; 3.5 mm dia
3-489-114-00
Belt, capstan
E, 2.5 mm dia
E, 2.5 mm dia
PS 3 x 6
X-3533-026-0
Arm Ass'y, tension
3-489-096-00
Spring, tension
3-519-044-00
Bracket, flywheel
3-533-065-00
Spring, torsion
P 2 x 4
3-489-116-00
Lever, REW
X-3489-307-0
Flywheel Ass'y
1-513-273-00
Switch, slide (MUTING)
SW, 2 mm dia
E, 2.5 mm dia
3-701-438-00
Washer, polyethylene; 2.5 mm dia
3-489-119-00
Spring, flat; timing lever
1-582-379-00
Printed Circuit Board, muting switch
3-489-095-00
Spring, tension
E, 3 mm dia
3-489-091-00
Spring, tension
W, 4 mm dia
3-489-118-00
Lever, timing
3-489-101-00
Spring, compression
3-533-117-00
Bracket, timing switch
X-3489-009-0
Lever Ass'y, fast forward
X-3533-001-0
Chassis Ass'y, main
3-481-275-00
Lever, fast forward
E, 2.5 mm dia
3-533-429-00
Lever, lock
3-489-105-00
Spring, torsion
PS 2.6 x 5
PS 2.6 x 5
X-4830-004-0
Plate Ass'y, slide; record
W, 2.6 mm dia
PS 2.6 x 6
PS 2.6 x 6
1-514-903-00
Switch, leaf (MOTOR)
3-488-054-00
Plate, adjustment
W, 3 mm dia
PS 2.6 x 5
3-489-094-00
Spring, tension
3-489-092-00
Spring, tension
(3-465-184-00
Absorber, noise)
3-489-093-00
Spring, tension
X-3489-018-0
Slider Ass'y
PS 3 x 12
3-489-091-00
Spring, tension
PS 2.6 x 6
P 3 x 6
3-519-034-00
Gear, capstan
1-516-486-00
Switch, leaf
3-427-408-00
Clamp, lead wire
4-830-086-00
Bracket, leaf switch

Note: o Items without part number and description are not available.
o All screws are Phillips (cross recess) type unless otherwise noted.
(–) = slotted head

(4)


3-481-225-00
Spring (A), torsion
3-481-226-00
Spring (B), torsion
3-481-225-00
Spring (A), torsion
3-481-226-00
Spring (B), torsion
E, 3 mm dia
E, 3 mm dia
3-533-079-00
Lever, eject
3-533-102-00
Spring, torsion
3-533-078-00
Lever (C), pushbutton
3-533-075-00
Shaft, pushbutton lever
3-533-077-00
Lever (B), pushbutton
3-533-076-00
Lever (A), pushbutton
E, 3 mm dia
3-533-080-00
Lever, pause
X-3533-005-0
Plate Ass'y, lock; pushbutton
X-3533-019-0
Pushbutton Ass'y, EJECT
3-533-097-00
Spring, torsion
E, 3 mm dia
X-3533-017-0
Pushbutton Ass'y, STOP
X-3533-018-0
Pushbutton Ass'y, REC
3-533-074-00
Leg, pushbutton
X-3533-016-0
Pushbutton Ass'y, REW/FWD/FF
X-3519-005-0
Bracket Ass'y, pinch roller
P 2 x 3
P 2.6 x 4
SW, 2.6 mm dia
SW, 2 mm dia
3-489-063-00
Spring, plate
3-519-011-00
Lever, release
E, 2 mm dia
4-839-914-00
Lever, pause actuating
4-839-913-00
Lever, pause
X-4839-901-0
Chassis Ass'y, pause
X-3533-010-0
Chassis Ass'y, pushbutton
1-516-265-00
Switch, leaf
3-533-085-00
Lever, record switch
E, 3 mm dia
B 2 x 5

Note: ○ Items without part number and description are not available.
○ All screws are Phillips (cross recess) type unless otherwise noted.
(-) = slotted head

SECTION 7
ELECTRICAL PARTS LIST

CIRCUIT BOARDS

Ref. No.	*Part No.*	*Description*
	A-2010-010-A	REC/PB Amp, complete
	1-582-379-00	Muting Switch
	1-591-110-00	Tape Select Switch

SEMICONDUCTORS

Ref. No.	*Part No.*	*Description*	
Q501(Q601)		Transistor	2SC631A
Q502(Q602)		Transistor	2SC631A
Q503(Q603)		Transistor	2SC633A
Q504(Q604)		Transistor	2SC633A
Q505(Q605)		Transistor	2SC633A
Q551(Q651)		Transistor	2SC633A
D101(D201)		Diode	10D-05
D102(D202)		Diode	10D-05
D103		Diode	10D-05

COILS

Ref. No.	*Part No.*	*Description*
L101(L201)	1-407-212-00	Microinductor, 33 mH
L102(L202)	1-407-157-00	Microinductor, 10 μH
	1-464-005-00	Unit, bias osc

CAPACITORS

All capacitors are in μF except as indicated with p (p means μμ).

Ref. No.	*Part No.*	*Description*		
C101(C201)	1-105-663-12	0.0015	50 V	mylar
C102	1-121-402-11	33	10 V	elect
C103(C203)	1-121-913-11	3.3	25 V	elect
C105(C205)	1-105-661-12	0.001	50 V	mylar
C106(C206)	1-121-651-11	10	16 V	elect
C107(C207)	1-101-881-11	47 p	50 V	ceramic
C108(C208)	1-121-409-11	47	16 V	elect
C109(C209)	1-121-651-11	10	16 V	elect
C110(C210)	1-121-651-11	10	16 V	elect
C111(C211)	1-105-677-12	0.022	50 V	mylar
C112(C212)	1-121-392-11	3.3	25 V	elect
C113	1-121-403-11	33	16 V	elect
C114(C214)	1-105-673-12	0.01	50 V	mylar
C115(C215)	1-102-975-11	100 p	50 V	ceramic
C116(C216)	1-121-409-11	47	16 V	elect
C117(C217)	1-121-392-11	3.3	25 V	elect
C118(C218)	1-121-726-11	0.47	50 V	elect
C119(C219)	1-121-391-11	1	50 V	elect
C120(C220)	1-108-555-12	0.001	50 V	mylar
C121(C221)	1-102-815-11	110 p	50 V	ceramic
C122(C222)	1-102-547-11	8 p	50 V	ceramic
C123(C223)	1-102-954-11	10 p	50 V	ceramic
C124(C224)	1-102-956-11	15 p	50 V	ceramic
C125(C225)	1-108-562-12	0.002	50 V	mylar
C301	1-121-990-11	22	16 V	elect
C302	1-121-416-11	100	25 V	elect
C304	1-121-733-11	470	25 V	elect
C305	1-121-416-11	100	25 V	elect
C306	1-121-661-11	3,300	6.3 V	elect
C307	1-108-411-12	0.0015	200 V	mylar
C308	1-107-200-11	430 p	500 V	silvered mica
C309	1-107-006-11	330 p	500 V	silvered mica

RESISTORS

All resistors are in Ω. ¼ W, carbon or composition resistors (except special type) are omitted. k = 1000, M = 1000 k.

Ref. No.	*Part No.*	*Description*		
R302	1-202-557-11	220	½ W	composition
R303	1-202-563-11	390	½ W	composition
R304	1-202-557-11	220	½ W	composition
R305	1-212-871-11	39	¼ W	metal-oxide (fuse type)

Ref. No.	*Part No.*	*Description*
RV202	1-222-771-00	1 k, adjustable (PLAYBACK level adj.)
RV301	1-222-775-00	22 k, adjustable (AGC balance adj.)

SWITCHES

Ref. No.	*Part No.*	*Description*
S1, 2	1-514-254-00	Slide (REC/PB)
S3	1-513-273-00	Slide (MUTING)
S4	1-514-903-00	Leaf (motor)
S5, 6	1-516-265-00	Leaf (tape selector, PAUSE)
S7	1-516-486-00	Leaf (REC lamp)

MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
	1-509-701-00	Connector, 6-P; male
PL1 ~ 3	1-518-169-xx	Lamp, cassette
	1-536-395-00	Terminal Strip, 1L1
	8-825-506-00	Head, ERASE (EF135-36)
	8-829-236-00	Head, REC/PB (PP128-3602)
	8-834-009-10	Motor (D-009G3)

STEREO MUSIC SYSTEM

HMK-40A

UK Model

SUPPLEMENT

No. 1
January, 1976

This supplement shows different points between HMK-40 and HMK-40A. File this supplement with the service manual for HMK-40.

Subject: Changes of record player section

1. CHANGED PARTS

Description	Part No.	
	HMK-40	HMK-40A
Cabinet Ass'y, receiver	X-4839-903-0	X-4839-908-0
Board Ass'y, record player	X-4838-112-0	X-4839-907-0
Plate (A), ornamental	4-830-039-00	4-830-039-11
Label, specification	4-839-930-00	4-839-956-00
Manual, instruction	3-780-530-41	3-780-842-41
Garrard Model	SP-25MKIV	35SB

2. ADDED PART

Description	Part No.
Cap	3-458-139-00

SONY®
SERVICE MANUAL

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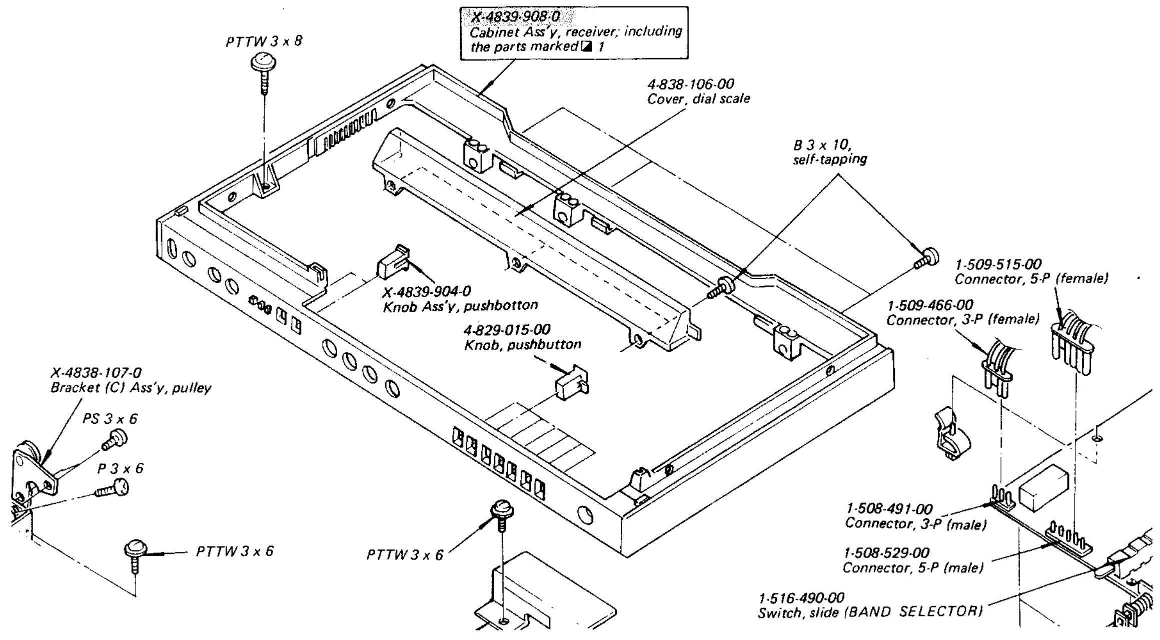
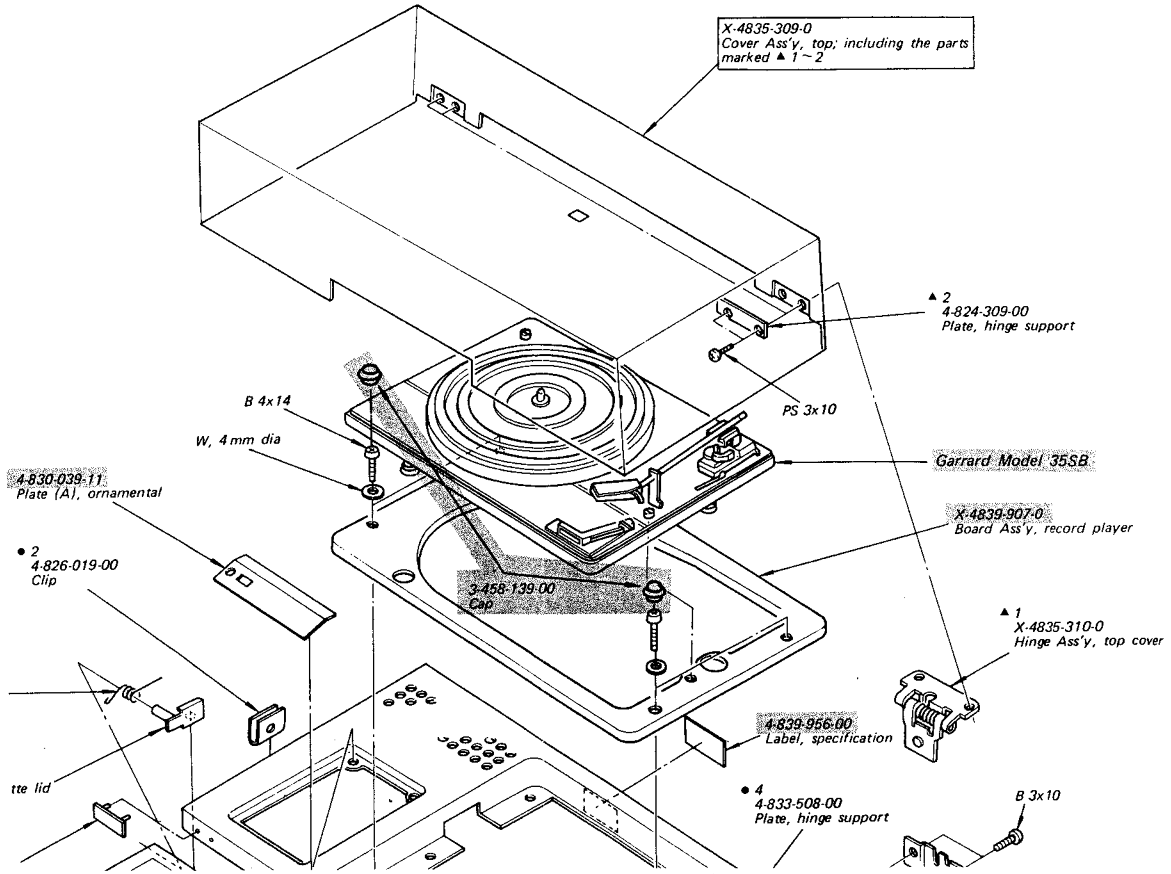
3. EXPLODED VIEWS

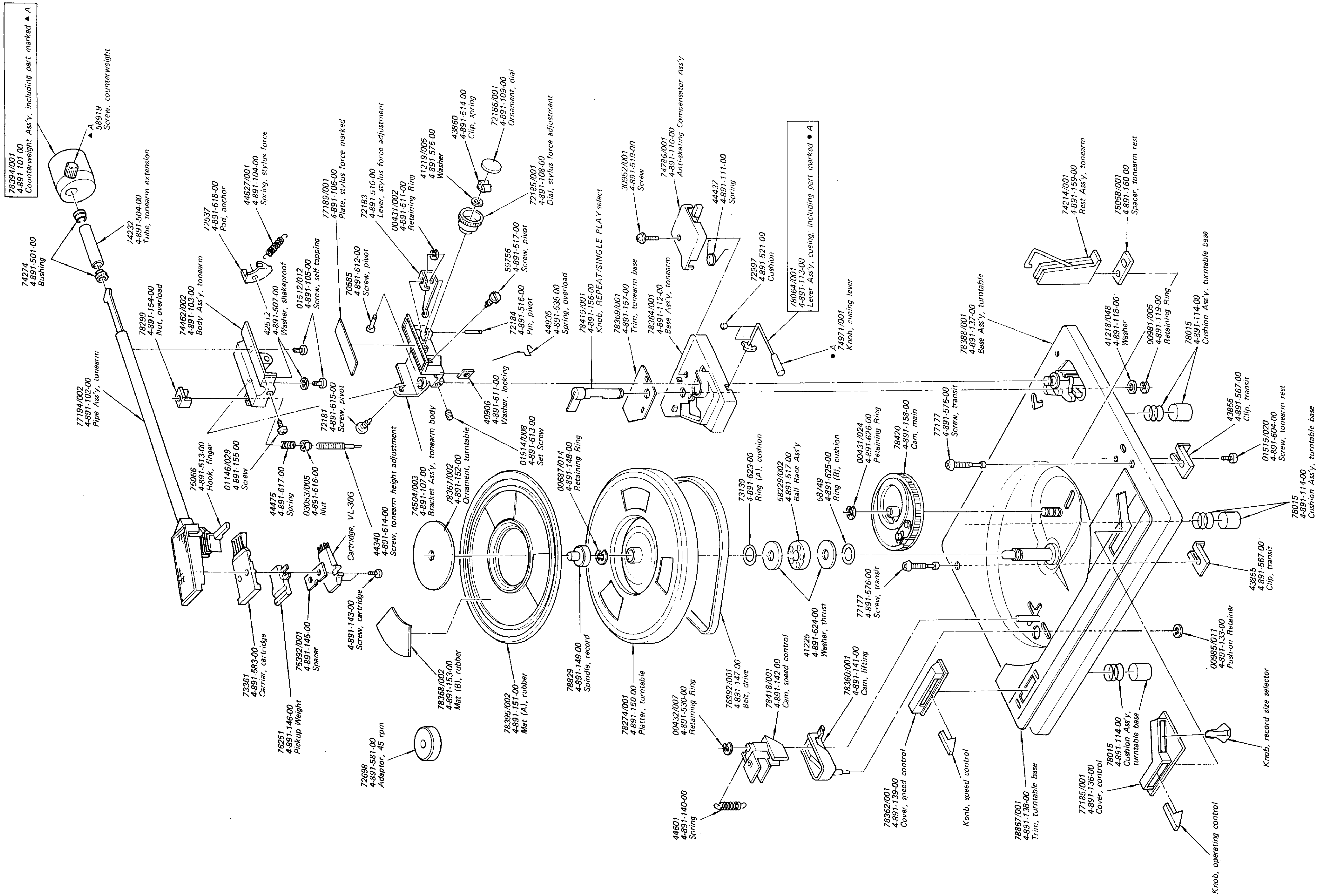
3-1. For HMK-40A

▨ : changed portion

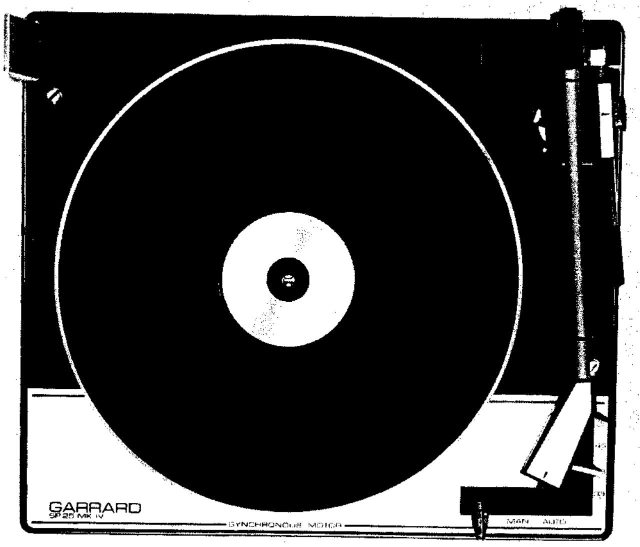

PTTW 3 x 8
X-4839-908-0
Cabinet Ass'y, receiver; including the parts marked ◪ 1
4-838-106-00
Cover, dial scale
B 3 x 10, self-tapping
1-509-515-00
Connector, 5-P (female)
1-509-466-00
Connector, 3-P (female)
X-4839-904-0
Knob Ass'y, pushbotton
4-829-015-00
Knob, pushbutton
X-4838-107-0
Bracket (C) Ass'y, pulley
PS 3 x 6
P 3 x 6
PTTW 3 x 6
PTTW 3 x 6
1-508-491-00
Connector, 3-P (male)
1-508-529-00
Connector, 5-P (male)
1-516-490-00
Switch, slide (BAND SELECTOR)


X-4835-309-0
Cover Ass'y, top; including the parts marked ▲ 1 ~ 2
▲ 2
4-824-309-00
Plate, hinge support
B 4x14
PS 3x10
W, 4 mm dia
Garrard Model 35SB
4-830-039-11
Plate (A), ornamental
X-4839-907-0
Board Ass'y, record player
● 2
4-826-019-00
Clip
3-458-139-00
Cap
▲ 1
X-4835-310-0
Hinge Ass'y, top cover
4-839-956-00
Label, specification
tte lid
● 4
4-833-508-00
Plate, hinge support
B 3x10

3-2. For Garrard Model 35SB (1)


78394/001 4-891-101-00 Counterweight Ass'y, including part marked ▲ A
▲ A 58919 Screw, counterweight
74232 4-891-504-00 Tube, tonearm extension
74274 4-891-501-00 Bushing
72537 4-891-618-00 Pad, anchor
44627/001 4-891-104-00 Spring, stylus force
77189/001 4-891-106-00 Plate, stylus force marked
72183 4-891-510-00 Lever, stylus force adjustment
00431/002 4-891-511-00 Retaining Ring
41219/005 4-891-575-00 Washer
43860 4-891-514-00 Clip, spring
72186/001 4-891-109-00 Ornament, dial
72185/001 4-891-108-00 Dial, stylus force adjustment
30952/001 4-891-519-00 Screw
74786/001 4-891-110-00 Anti-skating Compensator Ass'y
44437 4-891-111-00 Spring
78064/001 4-891-113-00 Lever Ass'y, cueing; including part marked ● A
72997 4-891-521-00 Cushion
● A 74971/001 Knob, cueing lever
78299 4-891-154-00 Nut, overload
74462/002 4-891-103-00 Body Ass'y, tonearm
42512 4-891-507-00 Washer, shakeproof
01512/012 4-891-105-00 Screw, self-tapping
70585 4-891-612-00 Screw, pivot
59756 4-891-517-00 Screw, pivot
72184 4-891-516-00 Pin, pivot
44935 4-891-535-00 Spring, overload
78419/001 4-891-156-00 Knob, REPEAT/SINGLE PLAY select
78369/001 4-891-157-00 Trim, tonearm base
78364/001 4-891-112-00 Base Ass'y, tonearm
74214/001 4-891-159-00 Rest Ass'y, tonearm
75058/001 4-891-160-00 Spacer, tonearm rest
78388/001 4-891-137-00 Base Ass'y, turntable
41218/048 4-891-118-00 Washer
00891/005 4-891-119-00 Retaining Ring
78015 4-891-114-00 Cushion Ass'y, turntable base
77194/002 4-891-102-00 Pipe Ass'y, tonearm
72181 4-891-615-00 Screw, pivot
40906 4-891-611-00 Washer, locking
01914/008 4-891-613-00 Set Screw
75066 4-891-513-00 Hook, finger
01146/029 4-891-155-00 Screw
44475 4-891-617-00 Spring
03053/005 4-891-616-00 Nut
Cartridge, VL-30G
44340 4-891-614-00 Screw, tonearm height adjustment
74504/003 4-891-107-00 Bracket Ass'y, tonearm body
78367/002 4-891-152-00 Ornament, turntable
00687/014 4-891-148-00 Retaining Ring
73139 4-891-623-00 Ring (A), cushion
58229/002 4-891-517-00 Ball Race Ass'y
58749 4-891-625-00 Ring (B), cushion
00431/024 4-891-626-00 Retaining Ring
78420 4-891-158-00 Cam, main
77177 4-891-576-00 Screw, transit
43855 4-891-567-00 Clip, transit
01515/020 4-891-604-00 Screw, tonearm rest
78015 4-891-114-00 Cushion Ass'y, turntable base
43855 4-891-567-00 Clip, transit
77177 4-891-576-00 Screw, transit
73361 4-891-583-00 Carrier, cartridge
75392/001 4-891-145-00 Spacer
4-891-143-00 Screw, cartridge
76251 4-891-146-00 Pickup Weight
78368/002 4-891-153-00 Mat (B), rubber
78395/002 4-891-151-00 Mat (A), rubber
78829 4-891-149-00 Spindle, record
78274/001 4-891-150-00 Platter, turntable
41225 4-891-624-00 Washer, thrust
76992/001 4-891-147-00 Belt, drive
78418/001 4-891-142-00 Cam, speed control
78360/001 4-891-141-00 Cam, lifting
00985/011 4-891-133-00 Push-on Retainer
Knob, record size selector
72698 4-891-581-00 Adaptor, 45 rpm
00452/007 4-891-530-00 Retaining Ring
44601 4-891-140-00 Spring
78362/001 4-891-139-00 Cover, speed control
Konb, speed control
78867/001 4-891-138-00 Trim, turntable base
77185/001 4-891-136-00 Cover, control
78015 4-891-114-00 Cushion Ass'y, turntable base
Knob, operating control

GARRARD
SP25MK IV


GARRARD
SP25 MK IV
SYNCHRONOUS MOTOR
MAN AUTO

RECORD CHANGER

SPECIFICATIONS

Speeds:	33 1/3, 45, 78 rpm
Drive system:	Idler-drive
Motor:	4-pole shading synchronous
Cartridge:	Magnetic type, SONY VL-30G
Optimum stylus force:	3 g
Stylus:	SONY diamond stylus ND-133 G (0.5 mil)

SONY®

SERVICE MANUAL

SECTION 1

DISASSEMBLY AND REPLACEMENT

Note: All screws are Phillips type (cross recess type) unless otherwise indicated.
(–) : slotted head.

1-1. STYLUS TIP REPLACEMENT

See Fig. 1-1.

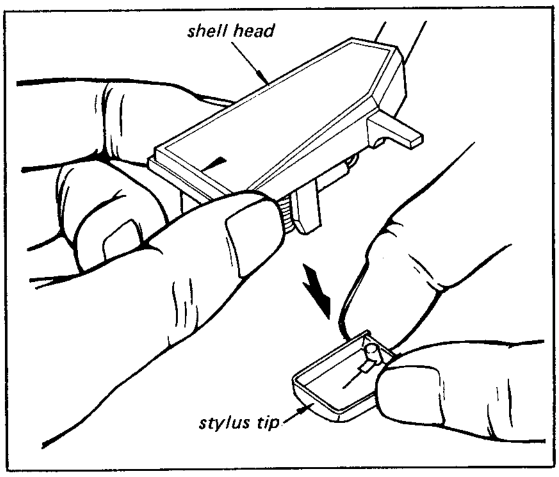

shell head
stylus tip

Fig. 1-1. Stylus tip replacement

1-2. CARTRIDGE REPLACEMENT

1. Place the tonearm on the tonearm rest.
2. See Fig. 1-2 and 1-3.

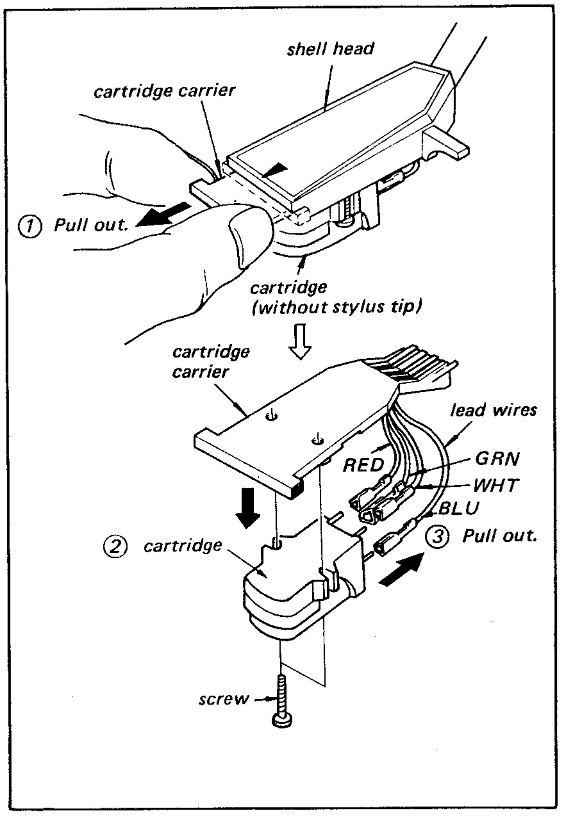

shell head
cartridge carrier
① Pull out.
cartridge
(without stylus tip)
cartridge
carrier
lead wires
RED
GRN
WHT
BLU
③ Pull out.
② cartridge
screw

Fig. 1-2. Cartridge replacement

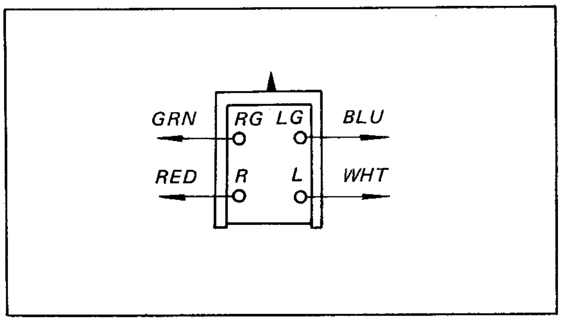

GRN
RG
LG
BLU
RED
R
L
WHT

Fig. 1-3. Wiring diagram of cartridge

1-3. TONEARM REPLACEMENT

1. Unsolder the four lead wires from the terminal strip shown in Fig. 1-5.
2. Carefully unstick the tape holding the lead wires to the turntable base as shown in Fig. 1-5.
3. See Fig. 1-4 (① ~ ⑤).
4. When reinstalling the tonearm, refer to the lead wire connection shown in Fig. 1-5.

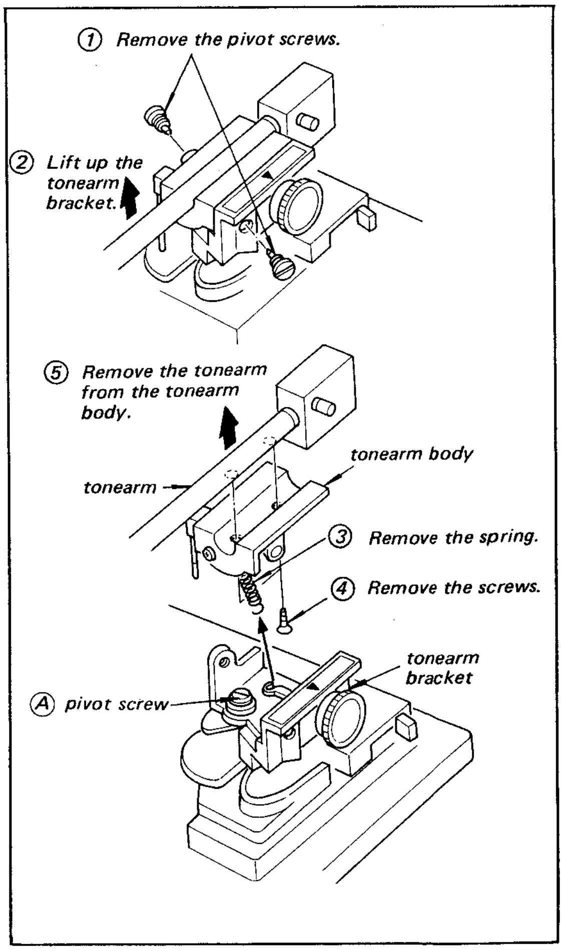

① Remove the pivot screws.
② Lift up the tonearm bracket.
⑤ Remove the tonearm from the tonearm body.
tonearm body
tonearm
③ Remove the spring.
④ Remove the screws.
tonearm bracket
Ⓐ pivot screw

Fig. 1-4. Tonearm replacement

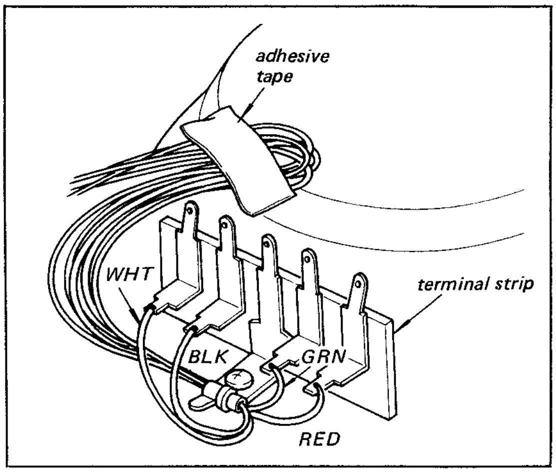

adhesive tape
terminal strip
WHT
BLK
GRN
RED

Fig. 1-5. Lead wire connection

1-4. TONEARM BRACKET REPLACEMENT

1. Remove the tonearm as described in Procedure 1-3.
2. Remove the tonearm bracket from the tonearm lever by taking out the pivot screw Ⓐ shown in Fig. 1-4.
3. Install the overload spring as shown in Fig. 1-6.

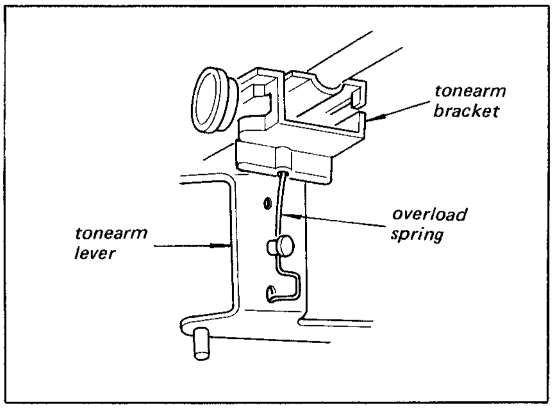

tonearm bracket
overload spring
tonearm lever

Fig. 1-6. Overload spring installation

1-5. TURNTABLE REMOVAL

See Fig. 1-7 (①～④).

Note: Refer to Fig. 1-8 for turntable retaining clip installation.

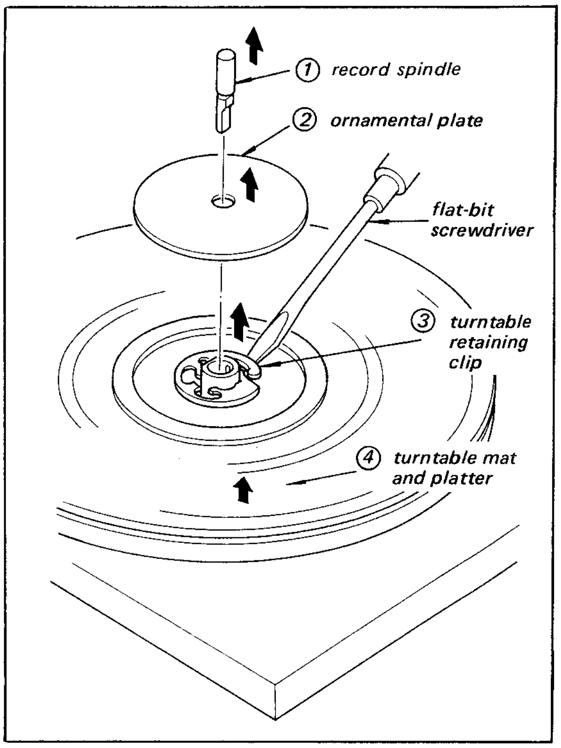

① record spindle
② ornamental plate
flat-bit screwdriver
③ turntable retaining clip
④ turntable mat and platter

Fig. 1-7. Turntable removal

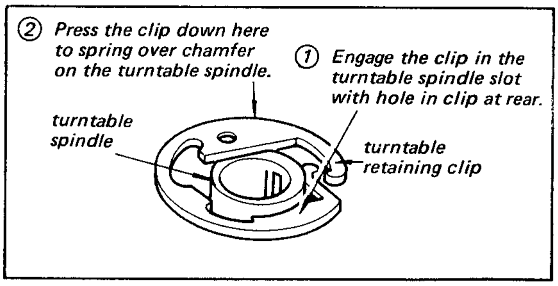

② Press the clip down here to spring over chamfer on the turntable spindle.
① Engage the clip in the turntable spindle slot with hole in clip at rear.
turntable spindle
turntable retaining clip

Fig. 1-8. Turntable retaining clip installation

1-6. TONEARM CAM REPLACEMENT

1. Turn the turntable clockwise by hand so that the guide plate is located at the center of long slit of tonearm cam as shown in Fig. 1-9.
2. See Fig. 1-9 (①～②).
3. Remove the turntable as described in Procedure 1-5.
4. See Fig. 1-10 (①～②).
5. Remove the tonearm cam carefully.

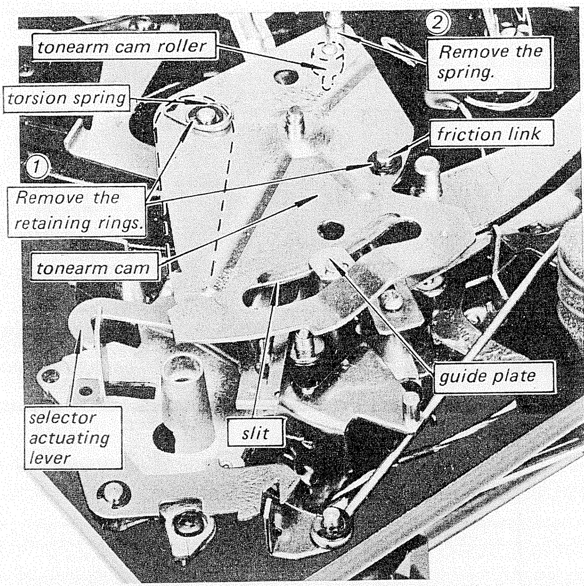

tonearm cam roller
② Remove the spring.
torsion spring
friction link
① Remove the retaining rings.
tonearm cam
guide plate
selector actuating lever
slit

Fig. 1-9. Tonearm cam replacement (1)

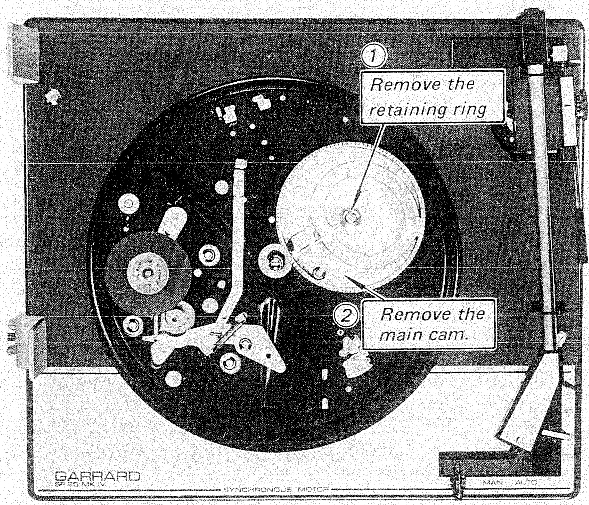

① Remove the retaining ring
② Remove the main cam.
GARRARD
SP25 MK IV
SYNCHRONOUS MOTOR
MAN AUTO

Fig. 1-10. Tonearm cam replacement (2)

Note: When refitting the tonearm cam, first attach the friction link to the cam with the retaining ring then with the selector actuating lever held in position shown in Fig. 1-9, locate the tonearm cam roller in the turntable base slot and main cam track, before locating it under its guide plate and on its pivot pin. At the same time, the main cam should come to the position shown in Fig. 1-11.

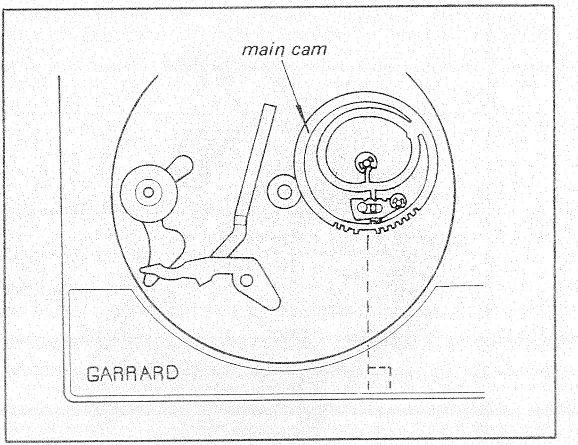

main cam
GARRARD

Fig. 1-11. Tonearm cam reinstallation

1-7. MOTOR REPLACEMENT

1. See Fig. 1-12.
2. See Fig. 1-13.
3. This frees the motor from the turntable base.

Note: After replacing the motor, perform intermediate wheel height adjustment as described in Procedure 2-5 on page 6.

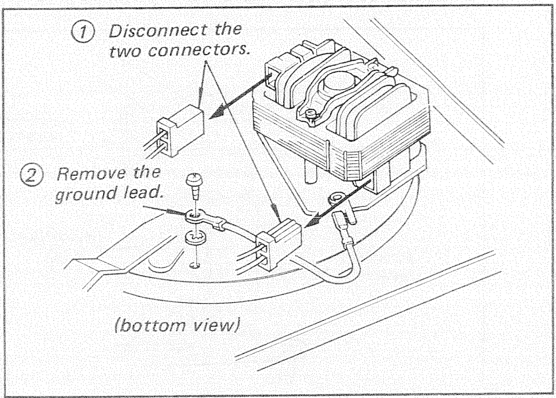

① Disconnect the two connectors.
② Remove the ground lead.
(bottom view)

Fig. 1-12. Motor replacement (1)

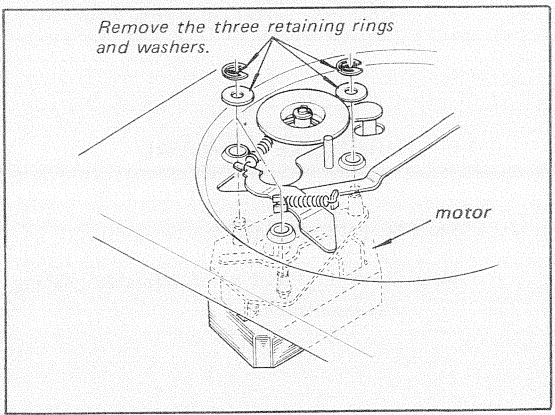

Remove the three retaining rings and washers.
motor

Fig. 1-13. Motor replacement (2)

SECTION 2

ADJUSTMENT AND MAINTENANCE

2-1. STYLUS FORCE ADJUSTMENT

1. Check that mechanism is not engaged by rotating the turntable slowly clockwise by hand until free running. Make sure cueing lever is set down.
2. Set the stylus force dial to zero.
3. Lift the tonearm from the its rest and remove the stylus cover.
4. Loosen the counterbalance weight clamp screw (see Fig. 2-1) and slide the counterbalance weight to position which balances the tonearm with the stylus tip about 3 mm (1/8″) above the turntable mat.
5. Clamp the counterbalance weight.
6. Set the stylus force dial to 3. This shows the stylus force recommended for the cartridge (VL-30G). Numbers on the dial represent 0 to 5 grams.

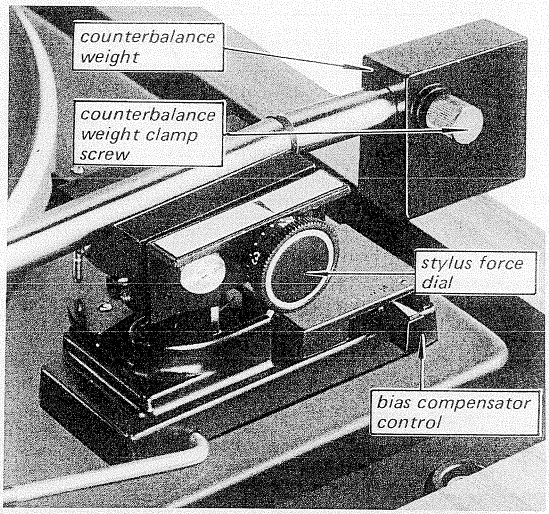

counterbalance weight
counterbalance weight clamp screw
stylus force dial
bias compensator control

Fig. 2-1. Stylus force adjustment

2-2. BIAS COMPENSATOR ADJUSTMENT

Move the bias compensator control shown in Fig. 2-1 along its scale to the figure which corresponds to the previously-set figure for stylus force.

2-3. STYLUS DROP-POINT ADJUSTMENT

This adjustment is factory-set but can be altered, if necessary, by turning the stylus drop-point adjustment screw shown in Fig. 2-2.

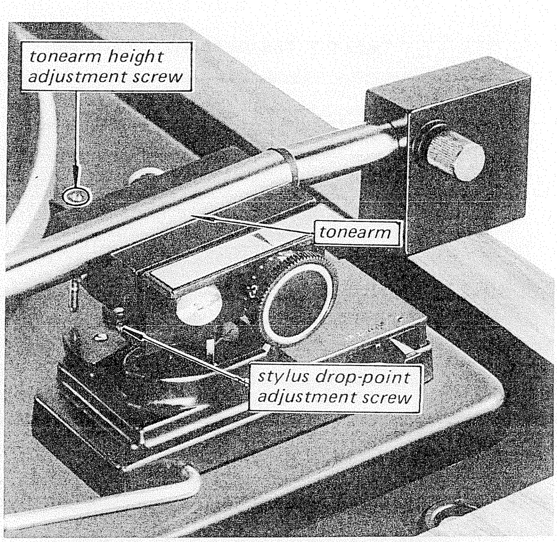

tonearm height adjustment screw
tonearm
stylus drop-point adjustment screw

Fig. 2-2. Stylus drop-point and tonearm height adjustment

Table 2-1. Stylus drop-point adjustment

Turning direction of adjustment screw	Drop-point
Clockwise	Inwards
Counterclockwise	Outwards

2-4. TONEARM HEIGHT ADJUSTMENT

Adjust the tonearm height as shown in Fig. 2-3 by turning the tonearm height adjustment screw shown in Fig. 2-2.

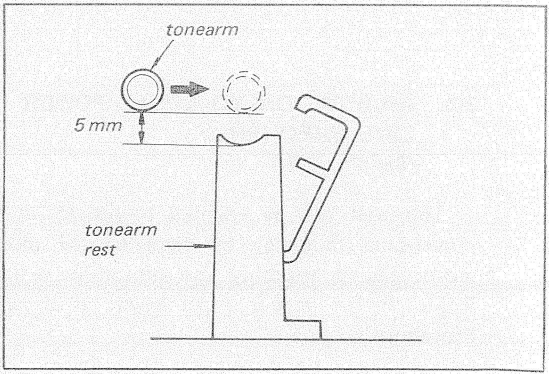

tonearm
5 mm
tonearm rest

Fig. 2-3. Tonearm height adjustment

Table 2-2. Tonearm height adjustment

Turning direction of adjustment screw	Tonearm height
Clockwise	Ascend
Counterclockwise	Descend

2-5. INTERMEDIATE WHEEL HEIGHT ADJUSTMENT

1. Adjust the intermediate wheel height by means of the blade (See Fig. 2-4) so that the intermediate wheel runs in the center of the correct pulley step without rubbing the adjacent step.
2. If necessary, adjust intermediate wheel height by means of the blade shown in Fig. 2-4.

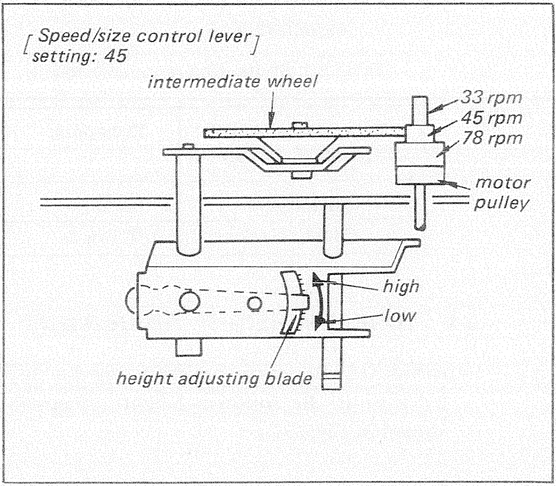

[Speed/size control lever setting: 45]
intermediate wheel
33 rpm
45 rpm
78 rpm
motor pulley
high
low
height adjusting blade

Fig. 2-4. Intermediate wheel height adjustment

2-6. ADAPTATION TO LOCAL POWER LINE FREQUENCY (See Fig. 2-5.)

This unit can be adapted to operate at another power-line frequency by changing the motor and motor pulley assembly and motor loom assembly. Refer to the motor replacement as described in Procedure 1-7.

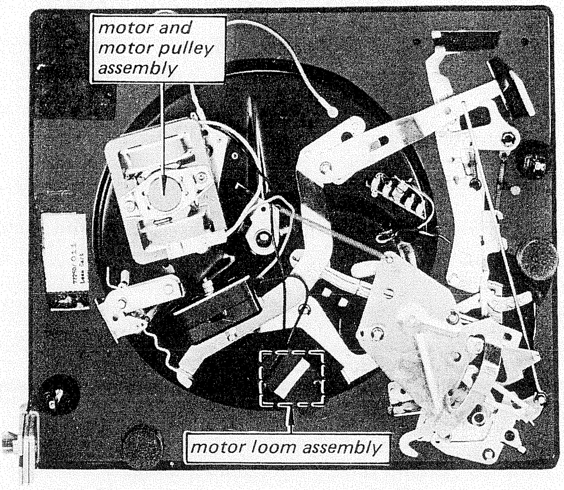

motor and motor pulley assembly
motor loom assembly

Fig. 2-5. Adaptation to local power line frequency

Table 2-3. Adaptation to local power line frequency

	Motor and motor pulley ass'y Part No.	Motor loom ass'y Part No.
220/240 volts 50 Hz	61027/014 (☆) X-4890-507-0 (○)	60365 (☆) X-4890-510-0 (○)
110/120 volts 60 Hz	61027/021 (☆) X-4890-508-0 (○)	61160/004 (☆) X-4890-509-0 (○)

Note: (☆) : Garrard Part No.
(○) : SONY Part No.

2-7. LUBRICATION (See Fig. 2-6.)

When the need is apparent, apply one or two drops of SONY oil OL-2K to the arrow portion (turntable shaft, intermediate wheel and main cam) shown in Fig. 2-6 and the cap of the motor shaft.

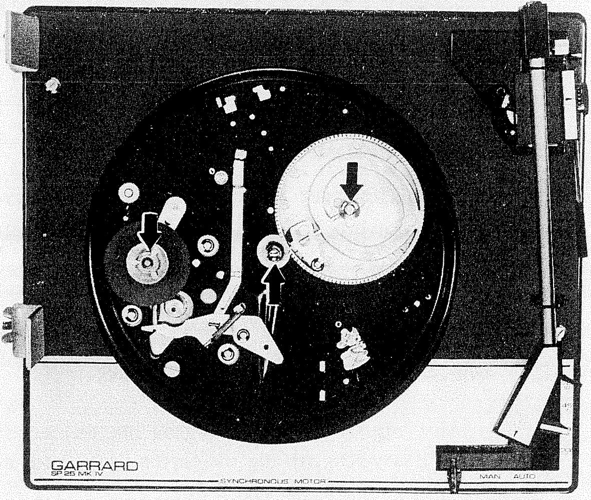

GARRARD
SP25 MK IV
SYNCHRONOUS MOTOR
MAN AUTO

Fig. 2-6. Lubrication

SECTION 3

TROUBLESHOOTING

Note: Numbers in circle (❶ ~ ㉝) refer to the exploded views.

Fault	Cause	Remedy
TURNTABLE SPEED (a) Turntable fails to start, runs slowly or at wrong speed when switched on.	1 Oil or dirt on driving surfaces.	1 Remove turntable (See Procedure 1-7) and clean inside rim, periphery of intermediate wheel ❶ and motor pulley ❷ .
	2 Faulty intermediate wheel spring ❸ .	2 Check that the spring is secured. Move operating control to AUTO – spring should stretch. If it does not, replace it.
	3 Intermediate wheel support bracket ❹ not free.	3 Wheel ❶ should engage motor pulley ❷ firmly when switched on and retract when switched off. If not, lightly oil spindles of the speed change mechanism assembly or replace damaged parts.
	4 No voltage or low voltage at motor ❺ .	4 Remove loom plugs from motor, switch on and check wiring with voltmeter. If no power, check back to source outlet, looking for loose connections, faulty switch contacts etc. Voltage should not be lower than 110 V if low range supply or 220 V if high range.
	5 Faulty motor coil.	5 Remove plugs from motor ❺ to check continuity of coils with ohmmeter. Replace motor if necessary.
	6 Bearings of motor ❺ out of line.	6 If rotor does not spin freely, tap the motor body with a small block of wood (e.g. screwdriver handle) to realign bearings. Use only thin oil on these bearings; thick oil will clog them.
	7 Motor pulley ❷ or intermediate wheel ❶ height incorrectly.	7 Adjust the intermediate wheel height as described in procedure 2-5 on page 6.
	8 Bearings not free.	8 Check motor ❺, intermediate wheel ❶ and turntable bearings. Clean and lightly oil if necessary. See lubrication as described in Procedure 2-7 on page 6.
(b) Irregular turntable speed (wow and flutter).	1 Various.	1 See Fault (a). Causes and Remedies 1, 7 and 8.
	2 Worn or oversize holes in records.	2 Align the record concentrically on the turntable by hand. Avoid using records on a record changer whose mechanism may be wearing the record holes.
	3 Damaged rotor shaft of motor ❺ .	3 Replace motor ❺ .
	4 Flats on driving surface of intermediate wheel ❶ .	4 If running the unit for a few hours does not cure the fault, replace the wheel ❶ . **Note:** Do not switch the unit off from the power supply before it has stopped automatically, as the unretracted wheel ❶ may form flats.
TONEARM MOVEMENT (c) Tonearm tracks incorrectly.	1 Dust accumulated around stylus tip.	1 Clean carefully.
	2 Stylus force too low.	2 Check that the force is not lower than that recommended for the cartridge. Adjust if necessary - Refer to "Stylus force adjustment" described in Procedure 2-1 on page 5.
	3 Bias compensator incorrectly set.	3 Make sure that the bias compensator is set correctly to correspond to the stylus force applied. Refer to "Bias compensator adjustment" described in Procedure 2-2 on page 5.
	4 Worn or wrong size of stylus tip radius.	4 Replace stylus.
	5 Tonearm leads tight or trapped at rear of arm.	5 Make sure leads are slack and check that they are not caught in or touching mechanism below the unit plate.

Fault	Cause	Remedy
	6 Groove guard on record (raised rim).	6 If used in "Auto" mode, the stylus may land too far out and slide down the slope of the raised rim on certain records, jumping the first playing grooves. Reset the stylus drop-point position so that it lands further in. Refer to stylus drop-point adjustment described in Procedure 2-3 on page 5.
	7 Body of tonearm cartridge touches record.	7 Make sure any cartridge fixing screws are secure and that the slide is in position properly.
	8 Counterbalance weight clamped off center.	8 Check that the weight ❻ is clamped in an untwisted attitude.
	9 Excessive friction in friction link ❼ .	9 Apply a drop of thin oil inside slot. See Fig. 3-1.
	10 Automatic trip links not free.	10 Move tonearm inwards by hand checking for link fouling trip pawl mechanism on main cam ❽ and auto stop link ❾ . Reshape or replace as necessary.
	11 Damaged tonearm pivot screw ❿ , ⓫ , ⓬ .	11 Replace as necessary.
(d) Tonearm lands on record too far out and/or in, on "Auto" play.	1 Drop-point incorrectly set.	1 Refer to "stylus drop-point adjustment" described in Procedure 2-3 on page 5.
	2 Friction link ❼ requires lubrication.	2 Apply a drop of thin oil inside slot. See Fig. 3-1.

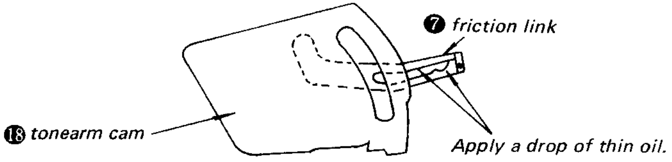


Fig. 3-1. Lubrication point

Fault	Cause	Remedy
(e) Tonearm fails to lower.	1 Cueing lever ⓭ not lowered.	1 Lower the cueing lever and check cueing height set correctly.
	2 Lifting spindle mechanism (⓮ , etc.) not free.	2 With tonearm raised slightly, lift the platform moulding at the top of the spindle. Although damped it should return slowly through pressure of spring ⓯ . If not, check for damage or restriction. Also check that lifting spring ⓰ has not slipped from its retaining shoulder on the spindle. See Fig. 3-2.
	3 Tonearm pivot screws ❿ and ⓬ not free.	3 Remove the pivots and check them for damage. Replace them if necessary.

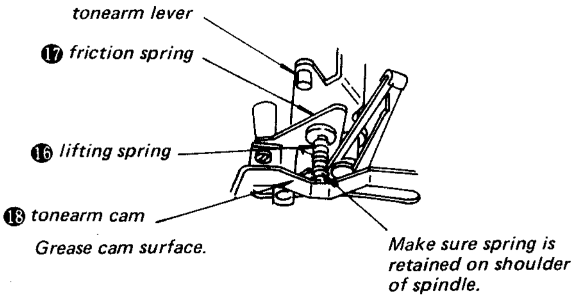


Fig. 3-2. Lifting spring location

Fault	Cause	Remedy
(f) Tonearm begins to lower then swings in.	1 Tonearm leads tight or trapped.	1 Slacken if necessary and see that they are not caught in mechanism below the unit plate.
	2 On "Auto" play, lifting spring ⑯ or friction spring ⑰ binding (See Fig. 3-2).	2 Check that the lifting spring is secure and moves freely. With lifting spring held clear, deflect friction spring away from tonearm cam ⑱ ; it should spring back when released. Replace damaged spring (s). See Fig. 3-2.
(g) Tonearm fails to lift and return at the end of the record.	1 Various.	1 See Fault (c). Causes and Remedies 1 to 5, 7, 8 and 9. Check that the lug on the trip pawl mounted on main cam ⑧ is square. Reshape it if necessary and make sure the trip pawl pivots freely.
	2 Non-standard record.	2 Replace record.
(h) Tonearm lowers too slowly when cueing.	1 Tight bearings or mechanism fouling.	1 Make sure that the tonearm pivots freely and that tonearm leads or mechanism do not restrict its movement. Note that a descent time of up to several seconds is considered acceptable and is unlikely to be caused by excess damping fluid.
(i) Tonearm wavers when lowered during cueing.	1 Play in lowering mechanism.	1 Make sure lock nut ⑲ is in its factory set position, keeping spring ⑳ in compression. The top of the nut should be $\frac{1}{16}$" (1.5 mm) in from the underside of the cast lug on tonearm body ㉑ . Also make sure that spring ⑮ is positioned so that its lower tail lodges against lifting platform ⑭ and its top tail pushes against the back of the boss on upper casting ㉒ thus preventing slack movement in the lifting platform.
	2 Lowering platform too smooth.	2 Rough up the underside of the platform rivetted to the top of tonearm lever ㉓ with fine emery paper.
(j) Fails to select, switches off.	1 Interselector lever bent.	1 Make sure tail of interselector lever on lower casting ㉔ makes appropriate contact with tail of switch lever ㉕ .
NOISE (k) Rumble, heard through speaker (s) while stylus is in blank record groove.	1 Rumble on record.	1 Check by playing other records, that a particular record is not at fault.
	2 Lack of lubrication of drive mechanism.	2 See lubrication as described in procedure 2-7 on page 6.
	3 Intermediate wheel ① rubbing against side of motor pulley step.	3 Check heights of wheel. See intermediate wheel height described in procedure 2-5 on page 6.
	4 Driving surface of intermediate wheel ① dirty, indented or hardened.	4 Clean the wheel with a cloth or scrape its driving surface to remove dirt. If this and running the unit for a few hours does not help, replace the wheel ① .
	5 Faulty installation	5 Check that the unit floats freely on its mounting springs ㉖ with damping pads ㉗ in place, that the motor ⑤ hangs freely in its rubber grommets ㉘ and that no part of the mechanism is in contact with the mounting board.
	6 Worn or dirty turntable bearings.	6 Clean cushion ring ㉙, thrust washers ㉚ , ㉛ and ball race ㉜ . Oil the ball race and replace the thrust washers if worn, or the rubber cushion ring if hardened. Make sure cushion ring ㉝ is positioned on the cast turntable boss. Check that thrust washers have polished faces to bearings.
(l) No sound.	1 Open circuit in tonearm leads.	1 Check the continuity of the tonearm leads from the cartridge to the tag strip (disconnect the cartridge before making this test). Make sure push-on tags are firmly in position.

SECTION 4
DIAGRAMS

4-1. SCHEMATIC DIAGRAM

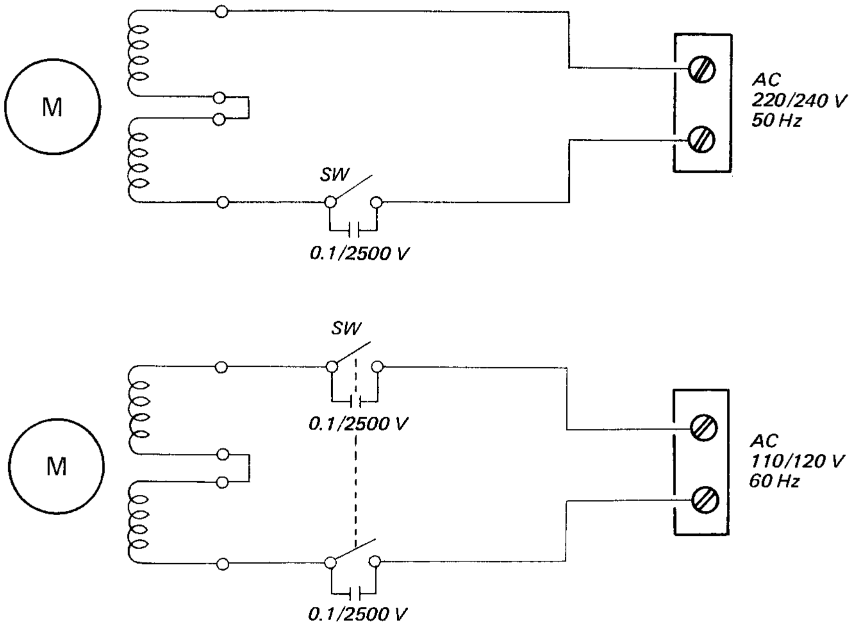

M
SW
0.1/2500 V
AC
220/240 V
50 Hz
M
SW
0.1/2500 V
0.1/2500 V
AC
110/120 V
60 Hz

Fig. 4-1.

4-2. PHONO-OUT WIRING DIAGRAM

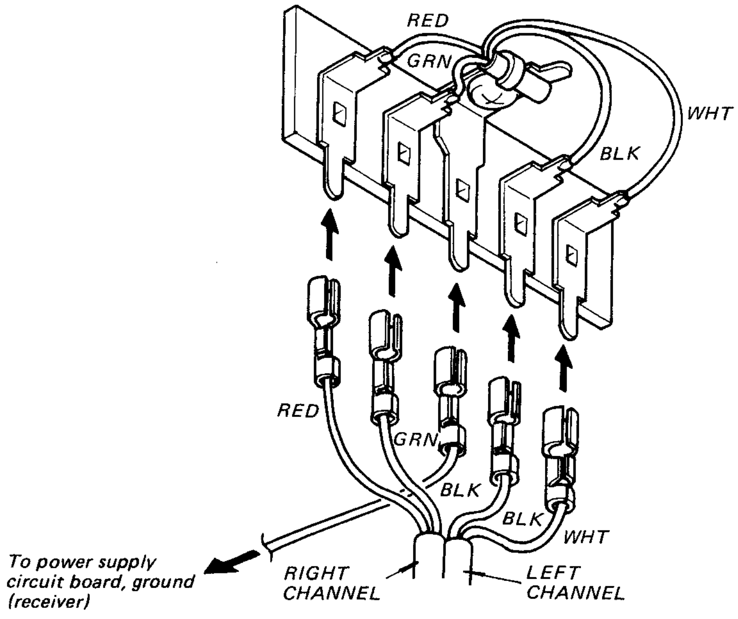

RED
GRN
WHT
BLK
RED
GRN
BLK
BLK
WHT
To power supply circuit board, ground (receiver)
RIGHT CHANNEL
LEFT CHANNEL

Fig. 4-2.

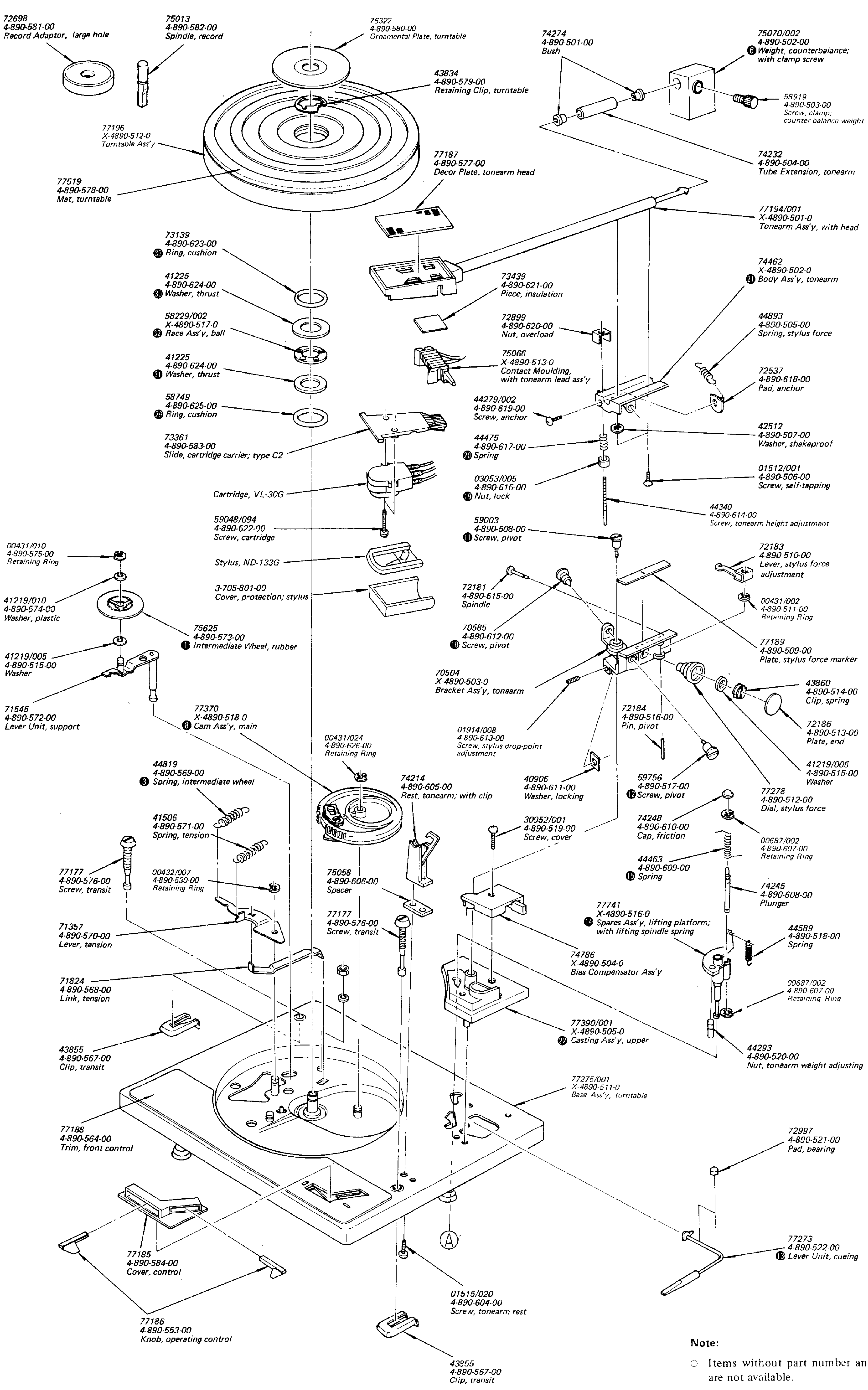
SECTION 5

EXPLODED VIEWS

(1)

Note: There are every two part numbers in the exploded views.

Ex. 72181 .... Garrard Part No.
4-890-615-00 ..... SONY Part No.
Spindle


72698
4-890-581-00
Record Adaptor, large hole
75013
4-890-582-00
Spindle, record
76322
4-890-580-00
Ornamental Plate, turntable
43834
4-890-579-00
Retaining Clip, turntable
77196
X-4890-512-0
Turntable Ass'y
77519
4-890-578-00
Mat, turntable
74274
4-890-501-00
Bush
75070/002
4-890-502-00
⑥ Weight, counterbalance; with clamp screw
58919
4-890-503-00
Screw, clamp; counter balance weight
74232
4-890-504-00
Tube Extension, tonearm
77187
4-890-577-00
Decor Plate, tonearm head
77194/001
X-4890-501-0
Tonearm Ass'y, with head
74462
X-4890-502-0
㉑ Body Ass'y, tonearm
73139
4-890-623-00
㉝ Ring, cushion
41225
4-890-624-00
㉚ Washer, thrust
58229/002
X-4890-517-0
㉜ Race Ass'y, ball
41225
4-890-624-00
㉛ Washer, thrust
58749
4-890-625-00
㉙ Ring, cushion
73439
4-890-621-00
Piece, insulation
72899
4-890-620-00
Nut, overload
75066
X-4890-513-0
Contact Moulding, with tonearm lead ass'y
44893
4-890-505-00
Spring, stylus force
72537
4-890-618-00
Pad, anchor
44279/002
4-890-619-00
Screw, anchor
42512
4-890-507-00
Washer, shakeproof
73361
4-890-583-00
Slide, cartridge carrier; type C2
44475
4-890-617-00
⑳ Spring
03053/005
4-890-616-00
⑲ Nut, lock
01512/001
4-890-506-00
Screw, self-tapping
Cartridge, VL-30G
44340
4-890-614-00
Screw, tonearm height adjustment
59048/094
4-890-622-00
Screw, cartridge
59003
4-890-508-00
⑪ Screw, pivot
00431/010
4-890-575-00
Retaining Ring
Stylus, ND-133G
72183
4-890-510-00
Lever, stylus force adjustment
3-705-801-00
Cover, protection; stylus
72181
4-890-615-00
Spindle
00431/002
4-890-511-00
Retaining Ring
41219/010
4-890-574-00
Washer, plastic
75625
4-890-573-00
① Intermediate Wheel, rubber
70585
4-890-612-00
⑩ Screw, pivot
77189
4-890-509-00
Plate, stylus force marker
41219/005
4-890-515-00
Washer
70504
X-4890-503-0
Bracket Ass'y, tonearm
43860
4-890-514-00
Clip, spring
72184
4-890-516-00
Pin, pivot
72186
4-890-513-00
Plate, end
71545
4-890-572-00
Lever Unit, support
77370
X-4890-518-0
⑧ Cam Ass'y, main
01914/008
4-890-613-00
Screw, stylus drop-point adjustment
00431/024
4-890-626-00
Retaining Ring
41219/005
4-890-515-00
Washer
44819
4-890-569-00
③ Spring, intermediate wheel
74214
4-890-605-00
Rest, tonearm; with clip
40906
4-890-611-00
Washer, locking
59756
4-890-517-00
⑫ Screw, pivot
77278
4-890-512-00
Dial, stylus force
41506
4-890-571-00
Spring, tension
30952/001
4-890-519-00
Screw, cover
74248
4-890-610-00
Cap, friction
00687/002
4-890-607-00
Retaining Ring
77177
4-890-576-00
Screw, transit
00432/007
4-890-530-00
Retaining Ring
75058
4-890-606-00
Spacer
44463
4-890-609-00
⑮ Spring
74245
4-890-608-00
Plunger
77741
X-4890-516-0
⑭ Spares Ass'y, lifting platform; with lifting spindle spring
77177
4-890-576-00
Screw, transit
71357
4-890-570-00
Lever, tension
44589
4-890-518-00
Spring
74786
X-4890-504-0
Bias Compensator Ass'y
71824
4-890-568-00
Link, tension
00687/002
4-890-607-00
Retaining Ring
77390/001
X-4890-505-0
㉒ Casting Ass'y, upper
43855
4-890-567-00
Clip, transit
44293
4-890-520-00
Nut, tonearm weight adjusting
77275/001
X-4890-511-0
Base Ass'y, turntable
77188
4-890-564-00
Trim, front control
72997
4-890-521-00
Pad, bearing
Ⓐ
77273
4-890-522-00
⑬ Lever Unit, cueing
77185
4-890-584-00
Cover, control
01515/020
4-890-604-00
Screw, tonearm rest
77186
4-890-553-00
Knob, operating control
43855
4-890-567-00
Clip, transit

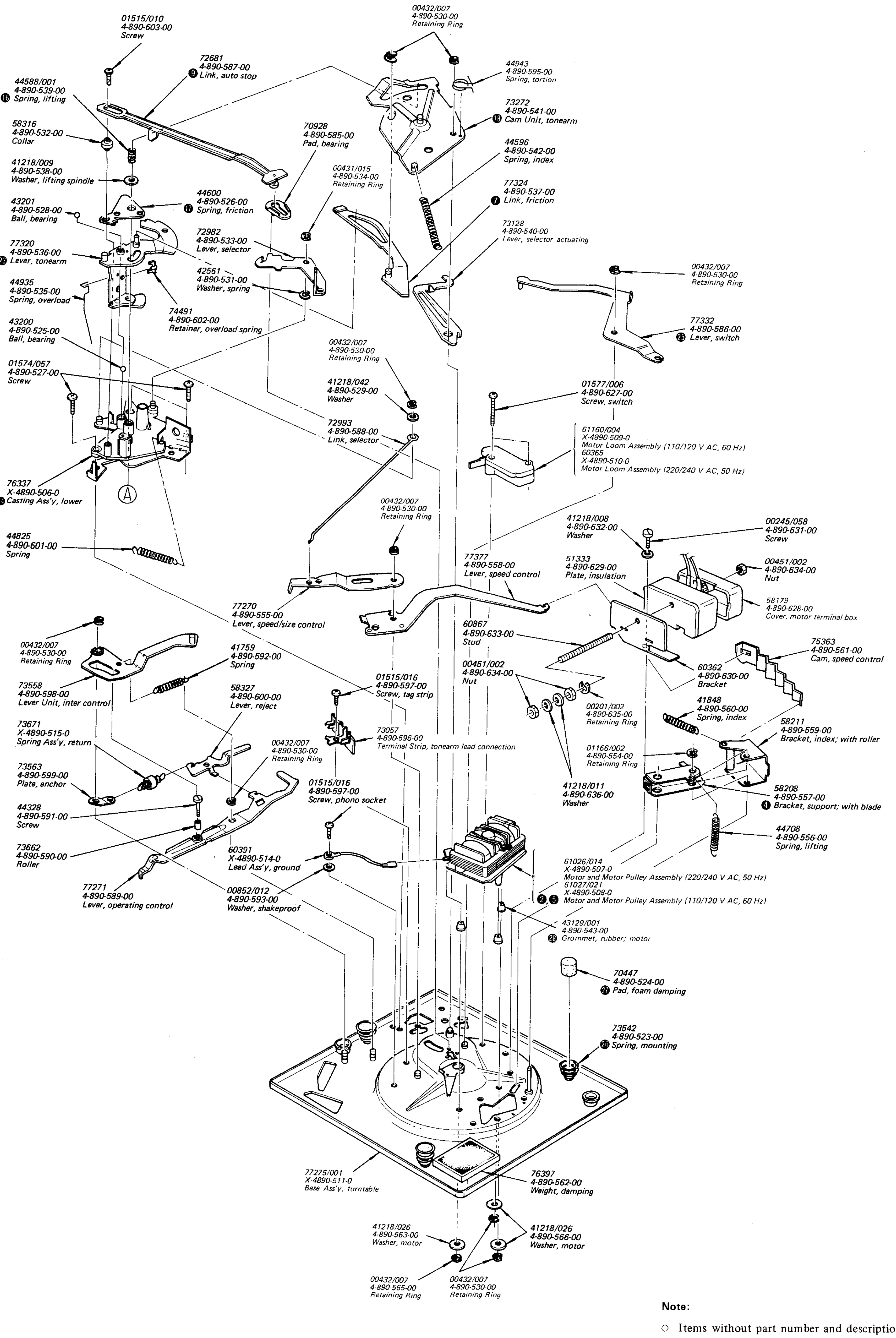
Note:

- ○ Items without part number and description are not available.
- ○ All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

(2)

Note: There are every two part numbers in the exploded views.

Ex. 73662 .... Garrard Part No.
4-890-590-00 ..... SONY Part No.
Roller


01515/010
4-890-603-00
Screw
72681
4-890-587-00
⑨ Link, auto stop
44588/001
4-890-539-00
⑯ Spring, lifting
58316
4-890-532-00
Collar
41218/009
4-890-538-00
Washer, lifting spindle
43201
4-890-528-00
Ball, bearing
44600
4-890-526-00
⑰ Spring, friction
77320
4-890-536-00
㉓ Lever, tonearm
72982
4-890-533-00
Lever, selector
42561
4-890-531-00
Washer, spring
44935
4-890-535-00
Spring, overload
74491
4-890-602-00
Retainer, overload spring
43200
4-890-525-00
Ball, bearing
01574/057
4-890-527-00
Screw
76337
X-4890-506-0
㉔ Casting Ass'y, lower
Ⓐ
44825
4-890-601-00
Spring
70928
4-890-585-00
Pad, bearing
00431/015
4-890-534-00
Retaining Ring
00432/007
4-890-530-00
Retaining Ring
44943
4-890-595-00
Spring, tortion
73272
4-890-541-00
⑱ Cam Unit, tonearm
44596
4-890-542-00
Spring, index
77324
4-890-537-00
⑦ Link, friction
73128
4-890-540-00
Lever, selector actuating
00432/007
4-890-530-00
Retaining Ring
77332
4-890-586-00
㉕ Lever, switch
00432/007
4-890-530-00
Retaining Ring
41218/042
4-890-529-00
Washer
72993
4-890-588-00
Link, selector
01577/006
4-890-627-00
Screw, switch
61160/004
X-4890-509-0
Motor Loom Assembly (110/120 V AC, 60 Hz)
60365
X-4890-510-0
Motor Loom Assembly (220/240 V AC, 50 Hz)
00432/007
4-890-530-00
Retaining Ring
41218/008
4-890-632-00
Washer
00245/058
4-890-631-00
Screw
77377
4-890-558-00
Lever, speed control
51333
4-890-629-00
Plate, insulation
00451/002
4-890-634-00
Nut
58179
4-890-628-00
Cover, motor terminal box
77270
4-890-555-00
Lever, speed/size control
60867
4-890-633-00
Stud
75363
4-890-561-00
Cam, speed control
00451/002
4-890-634-00
Nut
60362
4-890-630-00
Bracket
00432/007
4-890-530-00
Retaining Ring
41759
4-890-592-00
Spring
01515/016
4-890-597-00
Screw, tag strip
00201/002
4-890-635-00
Retaining Ring
41848
4-890-560-00
Spring, index
73558
4-890-598-00
Lever Unit, inter control
58327
4-890-600-00
Lever, reject
58211
4-890-559-00
Bracket, index; with roller
73671
X-4890-515-0
Spring Ass'y, return
73057
4-890-596-00
Terminal Strip, tonearm lead connection
01166/002
4-890-554-00
Retaining Ring
00432/007
4-890-530-00
Retaining Ring
73563
4-890-599-00
Plate, anchor
01515/016
4-890-597-00
Screw, phono socket
41218/011
4-890-636-00
Washer
58208
4-890-557-00
④ Bracket, support; with blade
44328
4-890-591-00
Screw
73662
4-890-590-00
Roller
60391
X-4890-514-0
Lead Ass'y, ground
44708
4-890-556-00
Spring, lifting
61026/014
X-4890-507-0
Motor and Motor Pulley Assembly (220/240 V AC, 50 Hz)
61027/021
X-4890-508-0
②,⑤ Motor and Motor Pulley Assembly (110/120 V AC, 60 Hz)
77271
4-890-589-00
Lever, operating control
00852/012
4-890-593-00
Washer, shakeproof
43129/001
4-890-543-00
㉘ Grommet, rubber; motor
70447
4-890-524-00
㉗ Pad, foam damping
73542
4-890-523-00
㉖ Spring, mounting
77275/001
X-4890-511-0
Base Ass'y, turntable
76397
4-890-562-00
Weight, damping
41218/026
4-890-563-00
Washer, motor
41218/026
4-890-566-00
Washer, motor
00432/007
4-890-565-00
Retaining Ring
00432/007
4-890-530-00
Retaining Ring

Note:

- ○ Items without part number and description are not available.
- ○ All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

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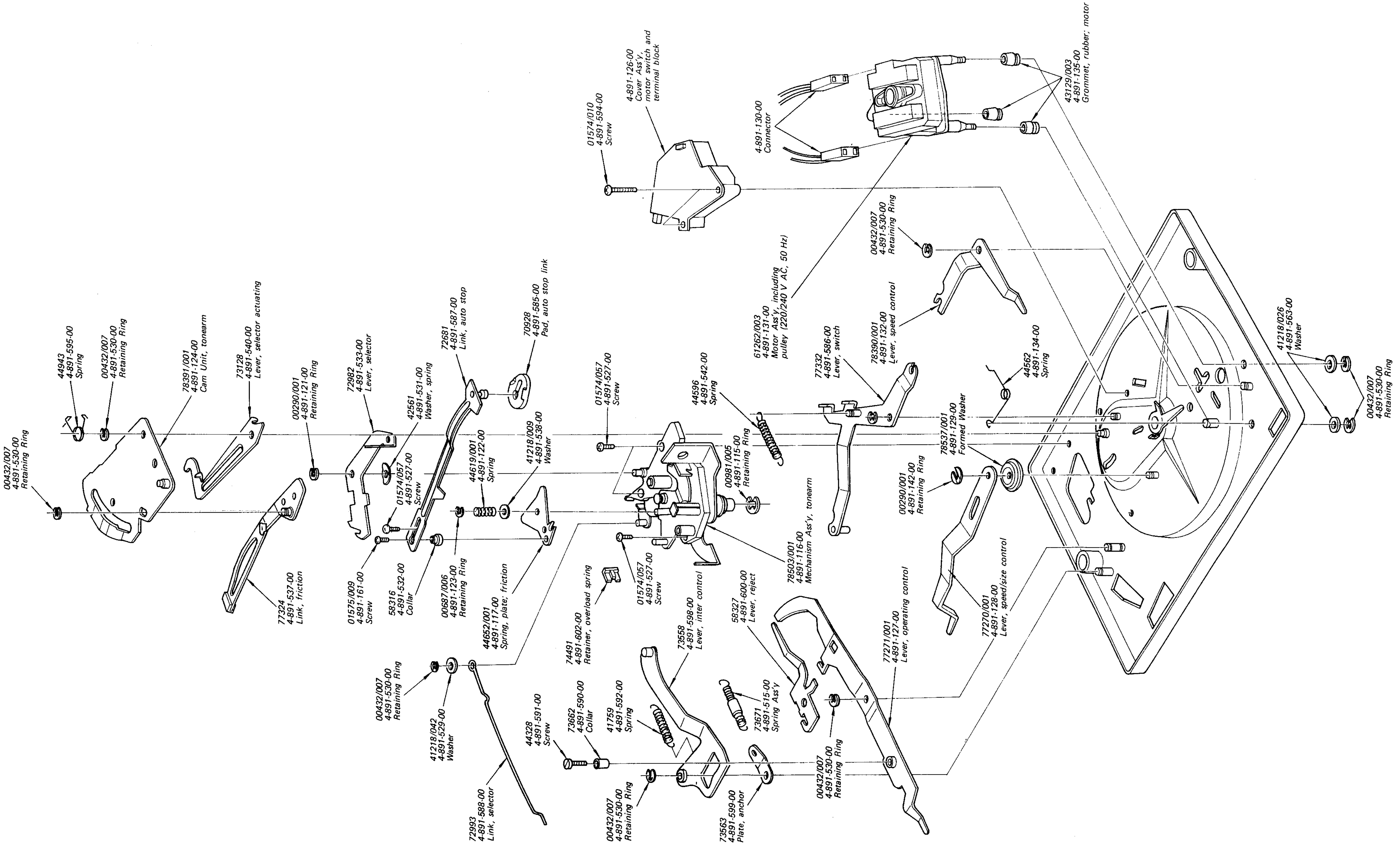
3-3. For Garrard Model 35SB (2)

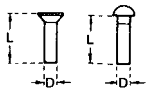

00432/007
4-891-530-00
Retaining Ring
44943
4-891-595-00
Spring
00432/007
4-891-530-00
Retaining Ring
78391/001
4-891-124-00
Cam Unit, tonearm
73128
4-891-540-00
Lever, selector actuating
00290/001
4-891-121-00
Retaining Ring
72982
4-891-533-00
Lever, selector
42561
4-891-531-00
Washer, spring
72681
4-891-587-00
Link, auto stop
70926
4-891-585-00
Pad, auto stop link
01574/057
4-891-527-00
Screw
44619/001
4-891-122-00
Spring
41218/009
4-891-538-00
Washer
01574/057
4-891-527-00
Screw
01574/010
4-891-594-00
Screw
4-891-126-00
Cover Ass'y,
motor switch and
terminal block
4-891-130-00
Connector
43129/003
4-891-135-00
Grommet, rubber; motor
61262/003
4-891-131-00 including
Motor Ass'y,
pulley (220/240 V AC, 50 Hz)
00432/007
4-891-530-00
Retaining Ring
78390/001
4-891-132-00
Lever, speed control
77332
4-891-586-00
Lever, switch
44596
4-891-542-00
Spring
00981/005
4-891-115-00
Retaining Ring
44562
4-891-134-00
Spring
78537/001
4-891-129-00
Formed Washer
41218/026
4-891-563-00
Washer
00432/007
4-891-530-00
Retaining Ring
00290/001
4-891-142-00
Retaining Ring
78503/001
4-891-116-00
Mechanism Ass'y, tonearm
77324
4-891-537-00
Link, friction
01575/009
4-891-161-00
Screw
58316
4-891-532-00
Collar
00687/006
4-891-123-00
Retaining Ring
44652/001
4-891-117-00
Spring, plate; friction
74491
4-891-602-00
Retainer, overload spring
01574/057
4-891-527-00
Screw
73558
4-891-598-00
Lever, inter control
58327
4-891-600-00
Lever, reject
77270/001
4-891-128-00
Lever, speed/size control
77271/001
4-891-127-00
Lever, operating control
00432/007
4-891-530-00
Retaining Ring
41218/042
4-891-529-00
Washer
72993
4-891-588-00
Link, selector
44328
4-891-591-00
Screw
73662
4-891-590-00
Collar
41759
4-891-592-00
Spring
73671
4-891-515-00
Spring Ass'y
00432/007
4-891-530-00
Retaining Ring
73563
4-891-599-00
Plate, anchor
00432/007
4-891-530-00
Retaining Ring

4. HARDWARE NOMENCLATURE

Screw:

– P 3 x 10

- *L: Length in mm*
- *D: Diameter in mm*
- *Type of head*
- *Indicated slotted-head only. Unless otherwise indicated, it means cross-recessed head (Phillips type).*

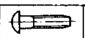
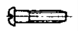
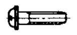
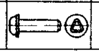
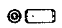
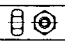
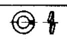


Nut, Washer, Retaining ring:

N 3

- *Diameter of usable screw or shaft*
- *Reference designation*

Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

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